Performance Analysis Services

Graduated Licensing Program

Interim Evaluation Report - Year 3

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Key Findings

1. BC's Graduated Licensing Program (GLP) has been successful in reducing the crash rate of New drivers. When tracked over a 3.4 year period, the GLP New drivers included in this evaluation had a crash involvement rate that was estimated to be 16% lower than that of a comparison group of Pre-GLP New drivers. The primary component contributing to the Program's success has been the extended Learner stage.

2. No evidence was obtained to support the continued provision of a time incentive to new drivers for completing an ICBC-approved driver education course. During the first six months of Novice (unsupervised) driving, the odds of a driver being involved in a crash were estimated to be 27% higher for those who completed an approved course than for those who reported taking no driver education. The shorter time spent in the learner stage by drivers who completed the course was one of the factors associated with this outcome.

Background

New drivers are at a higher risk of crash involvement than experienced drivers. Graduated licensing has been implemented in many jurisdictions, including BC, in order to address this problem. It helps new drivers gain experience gradually under conditions that expose them to less risk. The Graduated Licensing Program (GLP) in British Columbia has five primary components: 1) an extended Learner stage (increased from the Pre-GLP minimum of 30 days to 6 months, with up to a 3-month reduction for completing approved driver training; 2) an 18-month Novice stage; 3) specific licence restrictions applied during the Learner (supervised) and Novice (unsupervised) stages; 4) lower penalty point thresholds in both the Learner and Novice stages; and 5) two road tests – one to advance from the Learner (beginner) to the Novice (intermediate) stage, and one to advance from the Novice stage to full licensure. The program was developed and implemented in three Releases:

1. Release 1: The 6-month Learner stage, 18-month Novice stage, Learner and Novice licence restrictions, and enhanced adjudication sanctions were introduced August 1, 1998. Release 1 also included a new GLP driver education course curriculum, course approval process, instructor training, an Instructor Resource Kit (IRK); and a driver training manual ("*Tuning Up – A Manual for New Drivers and Co-Pilots");*
2. Release 2.1: The GLP exit tests (Class 5/6 road tests) were implemented January 24, 2000;
3. Release 2.2: New safe driving guides were introduced in September 2000 and new Knowledge tests were introduced October 16, 2000. New Class 7/8 (Learner to Novice) road tests and out-of-province rules for inexperienced drivers were implemented on November 27, 2000; and "*Tuning Up for Riders"* was released in December 2000.

Objectives

The aim of this evaluation is twofold:

1. To assess the impact of GLP (Release 1 and 2.1) on new driver crash and violation rates;

2. To examine relationships between participation in an ICBC-approved driver education course, crash involvement and driving exposure.

Method

This evaluation is based on three studies:

1. A cohort study comparing the crash involvement and violation rates of new drivers who entered GLP between August 1, 1998 and July 31, 1999 (N=45,822) with those of Pre-GLP drivers who obtained their first Learner's licence between August 1, 1996 and July 31, 1997 (N=67,086). To control for the influence of factors external to GLP, the crash and violation rates of two time-matched full privilege, experienced driver groups were also assessed. A follow-up period of 3.4 years was used.

2. A cohort study comparing the crash involvement and violation rates of GLP drivers who completed an approved driver education course and submitted a Declaration of Completion (the DOC) with those who did not submit a DOC. Again a follow-up period of 3.4 years was used.

3. A case-control study to assess associations between driver education, crash involvement and driving exposure. A total of 2,007 drivers involved in a crash during the first six months after they obtained a Novice (unsupervised) license were used as cases; 2,174 drivers who had no crash involvements during the first six months of Novice licensure served as controls.

Scope

Given the intake period of the drivers included in the evaluation, it examines only the implementation of Releases 1 and 2.1 of GLP. Less than one percent of the GLP drivers held a motorcycle licence. Due to these small numbers, GLP drivers with motorcycle licences are not treated separately from drivers who held passenger vehicle licences. Also, the drivers included in this evaluation were not exposed to the program components introduced in November and December 2000 (Release 2.2). Specifically, none of the drivers had access to the new safe driving guides, the new Knowledge tests, or the revised Class 7/8 road tests. As well, not enough drivers had graduated to full licensure to include an assessment of any potential benefits of the new exit tests (Class 5/6). Evaluation of the fully implemented program, and the Class 5/6 road tests, will not be possible until 2005.

Definitions

In this report, reference is made to three categories of drivers: 1) New drivers; 2) Learner drivers; and 3) Novice drivers. The terms "New Driver" and "Novice Driver" are often used interchangeably. However, in the present report they are not. The following specific definitions are used.

New Driver: Any driver who obtained their very first Learner's licence between August 1, 1996 and July 31, 1997 (Pre-GLP New driver), or between August 1, 1998 and July 31, 1999 (GLP New driver).

Learner Driver*:* Any New driver who had not yet passed their first road test. None of these drivers were permitted to drive unsupervised.

Novice Driver: Any New driver who had passed their first road test and was permitted to drive unsupervised.

Results

The Effect of GLP on New Driver Crash and Violation Rates:

Driver Participation

The number of Learner licences issued the year following GLP implementation was just over half the number of licences issued the year prior to GLP, when many of those who were age-eligible obtained a Learner licence in order to avoid the program. The number of Learner licences issued to new drivers increased during the second and third years after implementation. However, by the end of the study period it was still not possible to determine if the levels had returned to "normal" (i.e., to levels not influenced by the depletion of the age-eligible pool of drivers).

As of December 31, 2001, a total number of 174,551 new drivers had obtained a first Learner's licence under GLP. Of these, 103,480 (59.3%) were in the Novice stage at the end of 2001, and 7,952 (4.6%) had successfully progressed through the program and obtained a Full Privilege licence. GLP Learner licences were issued about equally to males and females.

Almost 80% of the drivers who obtained their first Learner licence in GLP by December 31, 2001 were 18 years of age or younger, and almost two-thirds (65.3%) were 16 year-olds. In contrast, not quite half (48.7%) of the drivers who obtained their first Learner licence prior to GLP (between January 1996 and December 1997) were 16 years of age at the time their licence was issued, and only about 63% were 18 years of age or younger.

Two factors may be contributing to the greater percentage of 16 to 18 year-old drivers in the GLP cohort, relative to the Pre-GLP cohort. Firstly, many drivers who were old enough to obtain a Learner's licence in 1998, prior to the implementation of GLP, did so. Thus, the pool of older drivers was diminished in the months leading up to GLP. Secondly, the longer GLP Learner stage may be prompting new drivers to enter the system sooner. If earlier licensure is an important factor then, over time, the proportion of young new drivers should remain high relative to Pre-GLP levels. This will be re-examined in a subsequent evaluation.

Compliance with GLP Licence Restrictions

Telephone surveys have indicated a generally high rate of self-reported compliance among new drivers with GLP restrictions. Non-compliance may, however, still be a concern. Of all the violations committed by GLP drivers during the study period, more than one quarter (27%) were for breaches of licence restriction (most of which are breaches of GLP licence restrictions). Learner drivers tend to have a lower rate of breaches (3.4 per 100 driver-years) relative to Novice drivers (11.8 per 100 driver-years). Examination of police-reported crashes suggests that non-compliance is an issue among Learner drivers who are involved in crashes.

New Driver Violation Rates

New Driver Violations and Prohibitions were tracked for two reasons:

1. To assess the extent to which the lower penalty point threshold introduced with GLP is being used as a sanction for GLP drivers;
2. To determine whether there is any indication that GLP drivers are being convicted of unsafe driving behaviours less frequently than do Pre-GLP drivers. If so, this may be an indication of an increase in safe driving behaviour among GLP drivers.

A comparison of the age- and gender-adjusted rates of speeding violations and other pointed violations (those that garner demerit points) revealed significant reductions in the rates of GLP drivers, relative to Pre-GLP

drivers. Lower violation rates were also observed for the GLP group after adjustment for their shorter Learner stage. Additional comparison of the rates of these violations between the two time-matched experienced driver groups produced no evidence that the reduction in rates observed for GLP drivers was likely attributable to reductions in enforcement or other non-GLP-related factors. Although such findings do not provide direct evidence of an improvement in the driving behaviours of GLP drivers, the results are suggestive.

Large increases were observed in the rates of 12/24-hour prohibitions and longer driving behaviour-related prohibitions and sanctions for GLP drivers, relative to Pre-GLP drivers. These increases suggest that the zero BAC requirement is being enforced, and the lower penalty point threshold introduced with GLP is resulting in more severe sanctions for drivers who engage in unsafe and illegal driving practices.

New Driver Crash Involvement Rates

The GLP in BC has been successful in reducing the crash rate of new drivers. For the GLP drivers included in this evaluation, the age- and gender-adjusted crash involvement rate was approximately 16% lower than that of the Pre-GLP comparison group. In an earlier assessment (Year 2 Interim Evaluation) the crash involvement rate was about 26% lower for the GLP new drivers.

The decline in the relative risk of crash involvement from the Year 2 to the Year 3 Evaluation is not surprising. In the computation of the rate reported in the Year 2 Evaluation (based on two years of follow-up) a much higher proportion of GLP than Pre-GLP drivers were still in the low-risk Learner stage. By the time the rate reported here was computed (based on 3.4 years of follow-up) most of these drivers had progressed to the higher risk Novice stage and, consequently, for this cohort, the benefits derived from the GLP's longer Learner stage were starting to diminish.

Two groups of experienced drivers were included in the study to provide an indication as to what portion of the reduction in crash rates observed for GLP drivers might be due to factors other than GLP. The experienced driver groups were selected so that their crash rates were calculated for the same periods of time used for the GLP / Pre-GLP rate comparisons. The 1998-99 cohort of experienced drivers had a crash rate that was only 4.6% lower (about 0.6 crash involvement less per 100 driver-year) than that of the 1996-97 cohort. This suggests that the observed reduction in the new driver crash involvement rate is largely due to GLP (accounting for about 3 fewer crash involvements per 100 new driver-years).

In addition to an extended Learner stage, GLP drivers also had new licence restrictions and lower penalty thresholds than Pre-GLP drivers. To determine whether there had been any detectable effects of these new restrictions and sanctions, crash involvement rates were computed for Learner drivers and Novice drivers separately. GLP Learner drivers were found to have a 10% lower crash involvement rate (about 0.3 crash involvements less per 100 Learner driver-years) than Pre-GLP Learner drivers. No difference was obtained between the Novice driver rates of the two groups. These results suggest that while the Learner stage restrictions appear to have had some impact on the crash risks of new drivers, the Novice stage restrictions have not. More meaningful or stringent restrictions and sanctions may be required in order to obtain an effect on crash rates during the Novice stage. The results also suggest that most of the reduction in the new driver crash involvement rate of GLP drivers (about 2.7 crash involvements per 100 new driver-years) is attributable to the longer time that GLP drivers spent in the supervised Learner stage. Additional rate reductions, therefore, could be effected by a further extension of the GLP Learner stage.

No evidence was found to suggest that GLP had a positive impact on the severity of new driver crash involvements. Given that the majority of crashes occur during the Novice stage, this too may be due to a lack of meaningful restrictions on GLP Novice drivers.

The lack of a reduction in the severity and rate of GLP Novice driver crash involvements suggests that more needs to be done to reduce the crash risks of these drivers. Additional restrictions (e.g., limitations in the number of passengers permitted) and/or stiffer sanctions (e.g., maintaining a prohibition-free driving record) may be required in order to effect changes in their crash rates.

Effects of the ICBC-Approved Driver Education Course on GLP Crash Involvement and Violation Rates

GLP Learner drivers are eligible to apply to have their Learner stage reduced by up to three months if they complete an ICBC-approved driver education course and submit a Declaration of Completion (DOC) certificate to an ICBC Point of Service. This time incentive was provided based on an assumption that the benefits of the approved course would be sufficient to offset any potential detriments resulting from a shortened Learner stage. To explore the validity of this assumption a cohort study was undertaken to compare the crash involvement rates of drivers who submitted a DOC with those who did not.

Sample Description

- Approximately 18% of the GLP drivers included in the study had submitted a DOC;
- The length of the Learner stage was, on average, 3.7 months for the DOC group (n=8,802) and 9 months for the No DOC group (n=37,340).
- A much higher percentage of drivers who submitted a DOC were 16 when they obtained their first Learner licence than those who did not (80% and 65%, respectively). As well, a much higher percentage of the DOC drivers than the No DOC drivers were 16 when they graduated into the Novice stage (74% and 54%, respectively).
- There were slightly higher percentages of male than female drivers in both the DOC and No DOC groups.

DOC Submission and GLP Driver Violation and Prohibition Rates

To investigate differences in the driving behaviours of drivers in the DOC and No DOC groups, violation and prohibition rates were compared. Over the full 3.4 year study period, drivers in the DOC group were found to have higher violation and prohibition rates than drivers in the No DOC group. This difference was attributable primarily to the shorter time drivers in the DOC group spent in the Learner stage. During the Learner stage, violation and prohibition rates are very low, relative to the Novice stage. Consequently, by being in the Learner stage for a shorter period of time, the overall violation and prohibition rates of the DOC group are more heavily weighted by their Novice rates than are those of the No DOC group.

Novice drivers in the DOC group were generally found to have age- and gender-adjusted violation and prohibition rates that were similar to or lower than those of Novice drivers in the No DOC group.

DOC Submission and GLP Driver Crash Involvement Rates

A significantly higher overall crash involvement rate was observed for drivers in the DOC group than in the No DOC group. After adjusting for age and gender, the overall New driver crash involvement rate for the DOC group was estimated to be 45% higher than for the No DOC group. This comparison was based on crashes that occurred during the full 3.4 year study period, and again simply demonstrates the effect of the DOC group's shorter Learner stage. More drivers from the DOC group were in the higher risk Novice stage for a greater proportion of the 3.4 year study period than were the drivers from the No DOC group. Consequently, more of the drivers in the DOC group were at a higher risk of crashing for a longer period of time than those in the No DOC group.

Although important, this finding does not address the question of whether or not the ICBC-approved driver education course was effective in producing Novice drivers with similar, if not lower, crash involvement rates than those who did not take an approved course. For this, the crash involvement rates of Novice drivers have to be compared.

After adjustment for age and gender, Novice drivers in the DOC group were found to have a 26% higher crash involvement rate, during their first year of unsupervised driving, than those in the No DOC group. During the first two years of Novice driving, the DOC group was found to have an 18% higher rate than the No DOC group.

As with the comparisons of New driver crash rates, an important factor that may contribute to the higher crash involvement rates of the Novice drivers in the DOC group may be their shorter Learner stages. After adjusting for the length of time spent in the Learner stage, Novice drivers in the DOC group were found to have a crash involvement rate, during their first year of unsupervised driving, that was 13% higher than that of the No DOC group. This was about half the difference observed before adjustment for time spent in the Learner stage. Moreover, when examined over the first two years of Novice driving, the crash involvement rates of the DOC and No DOC groups did not differ significantly, after adjustment for time spent in the Learner stage. These findings suggest that the shortening of the Learner stage for the DOC group was an important factor influencing the group's crash involvement rate. However, it does not appear to be the only factor – particularly during the early months of Novice licensure when the impact of driver education would be expected to be at its peak. These results provide little support for using a time incentive to promote participation in the course. It should be noted, however, that conclusions from this study must be drawn cautiously for the following reasons:

1. It was not possible to take into account other potential explanatory factors such as driver motivation and attitudes, the amount and type of driving undertaken by DOC relative to No DOC drivers, or whether or not the ICBC approved curriculum had been implemented in a standard and consistent manner.

2. It was not possible to ensure that the comparison group of drivers (the No DOC group) did not contain drivers who had taken some formal driver education. In fact, the drivers in this group may have taken a full ICBC course even though they did not submit a DOC, they may have taken some other form of driver education, or they may have taken no formal driver education.

It was beyond the scope of this evaluation to undertake a full assessment of the ICBC-approved course. However, an earlier study (P*reliminary Evaluation of the Initial Implementation of the ICBC- Approved Driver Education Course, October 2000)* found that the GLP driver education course had not been consistently implemented as defined in the GLP curriculum *Mapping a Safe Course.* Two areas of specific concern noted in the preliminary evaluation were that:

1. Some students were being issued DOC's when they had not adequately met the exit competencies of the GLP course;
2. Attitudes and behavioural competencies were not being consistently and adequately addressed in the delivery of the GLP curriculum.

To what extent inconsistent or incomplete implementation of the GLP curriculum has contributed to the higher crash rates of DOC Novice drivers is not clear at the present time. However, results consistent with those reported in this study have been reported in other jurisdictions (e.g., Ontario and Nova Scotia) even though they have different approaches to the regulation and provision of driver education. The consistency of the results across jurisdictions and approaches suggests that something more than the form and content of driver education may be at work.

To explore relationships between factors such as safe driving attitudes, amount and type of driving, participation in driver education and crash involvement an additional study was undertaken as part of this evaluation. Approximately 2000 drivers who had been involved in a crash during the first 6 months of Novice licensure were identified as the cases for the study, and about 2000 drivers who had been involved in no crashes during this time period were selected as controls. The results of this study are described below.

Driver Education, Crash Involvement, and Driving Exposure

A telephone survey was conducted to collect information concerning the amount and type of driver education taken, the amount and type of driving exposure experienced by the Novice drivers, their confidence in their ability to drive, and their attitudes towards risky driving. The survey was conducted in October 2003.

Consistent with the results obtained in the cohort study described earlier, drivers in the case-control study who submitted a DOC had a significantly higher (40%) odds of crash involvement than drivers who did not submit a DOC.

However, an important contribution of the information collected in the October 2003 Novice driver survey was that it enabled a more detailed classification of the types of driver education that individuals participated in as a means to learn how to drive. Thus, for this study four groups of drivers were identified:

1. those who took an ICBC-approved course and received a time credit;
2. those who took an ICBC-approved course but did not receive a time credit;
3. those who took some formal training but not an approved course; and
4. those who did not attend a driver training school (i.e., the no driver education group).

The primary objective of this study was to estimate the odds ratios of the driver education groups (relative to the no driver education group) after adjustment for known confounding factors, such as age and gender, and the potentially confounding effect of driving exposure. Several measures of driving exposure were developed for the study. All were found to be significantly associated with involvement in a crash as well as with driver education group membership. Frequency of driving during the first six months of Novice licensure was selected as the variable used in the study to illustrate the effects of driving exposure.

After adjustment for age, gender, and frequency of driving during the first six months of Novice driving, the two groups of drivers who had completed an ICBC-approved course (whether for time credit or not) had significantly higher odds of crash involvement (27% and 26%, respectively) than drivers who did not take any formal driver education.

Other factors that were explored in an effort to explain the differences between the driver education groups and their odds of crash involvement included: driver confidence, vehicle ownership, attitudes towards speed and driving, and region of residence at time of Novice licensure. Although the magnitudes of the odds ratios were altered somewhat when these factors were included in the analyses, none were found to alter the relative ordering of the ratios obtained for the 4 study groups.

Finally, an effort was made to investigate possible relationships between the quality of the ICBC-approved course offered by the driver training schools represented in the study. Unfortunately, the measure of course quality was very broad and not all of the schools had been assessed to the required level. Further assessment of schools will be required before such analyses can produce meaningful results.

In summary, driving exposure was not found to be an important factor explaining the relationship between crash involvement and participation in the ICBC-approved driver education course. The length of time drivers spend in the Learner stage appears to be an important factor but, this too does not entirely explain the observed relationship. To fully explain why graduates of the approved course have higher crash rates than drivers who take no formal driver education, motivational factors (especially among the youngest drivers), lifestyle factors – including parental involvement in the licensing process and, perhaps, factors related to the content, timing and mode of driver education need to be further explored.

Neither the cohort nor the case-control studies conducted in this evaluation provided evidence that the ICBC-approved driver education course was effective in reducing the crash involvements of Novice drivers. While there may be other practical and valid reasons for taking an approved course, it cannot be assumed that it will produce safer drivers. In addition, no support was obtained for providing an incentive that reduces the length of time new drivers spend in the Learner stage. Although more research is needed to fully understand all of the factors contributing to these results, the finding of higher crash rates and odds ratios for drivers who completed an approved course runs counter to GLP's goal of reducing new driver crash involvements. Until such time as a driver education course can be demonstrated to have a positive effect on Novice driver crash rates, there is little rationale for ICBC to continue to promote it as a means of producing safer drivers.

Recommendations arising from the Evaluation:

To optimize the benefits attainable through GLP:

1. The GLP minimum Learner stage should be extended (already implemented).

2. Additional restrictions and conditions should be applied in the GLP Novice stage (already implemented).

3. The time incentive associated with the completion of the approved driver education course should be considered for removal.

4. Consultations should be undertaken with the driver training industry to review the future of the approved driver education course as a component of BC's GLP.

5. A final evaluation of GLP, including assessment of the effectiveness of the Class 5/6 road test, and inclusion of drivers who have experienced the fully implemented program (2001 driver cohort) should be undertaken.

Section 2. Introduction

Introduction of graduated licensing in British Columbia (BC) occurred on August 1, 1998. The Graduated Licensing Program (GLP) implementation spanned three stages, with full implementation of the original project model completed on November 27, 2000.

Although BC's GLP includes passenger vehicle drivers and motorcycle riders, this evaluation does not distinguish between the two, as motorcycle riders make up less than 1% of all GLP licence holders.

The primary purpose of this report is to provide an interim assessment of the impact of GLP and the ICBC-approved driver education course on the crash and violation rates of new drivers. Within the report, the results of three studies are presented.

Study1: The results of a comparative cohort study examining the impact of GLP on the crash and violation rates of new drivers are presented. The crash and violation records of drivers who entered GLP between August 1, 1998 and July 31, 1999 are tracked from their date of entry in the program, up to December 31, 2001 (a maximum of 3.4 years). A cohort of drivers who obtained their first learner's licence between August 1, 1996 and July 31, 1997 served as the Pre-GLP comparison group for this study. Only 15% of the drivers in the GLP cohort had graduated to a Full Privilege licence by the end of the study period (December 31, 2001), and due to the staged implementation of GLP, none had exposure to the full program.

Study 2: The results of a comparative analysis of relationships between completion of the ICBC-approved driver education course and the crash and violation rates of GLP drivers are presented. The same GLP cohort described above was used in the conduct of this study. The cohort was divided into two groups based on whether or not the drivers in the cohort had completed the ICBC course and submitted a Declaration of Completion (DOC) certificate to an ICBC service centre.

Due to the small number of drivers in the GLP cohort who had advanced to Full Privilege licence status by December 31, 2001, this report does not include an evaluation of the impact of the Class 5/6 road test on the crash rate of GLP graduates. Similarly, due to the timing of the introduction of the new Class 7/8 road test, the report does not include an evaluation of its effect on the Novice driver crash rate. A comprehensive evaluation of the fully implemented program will not be possible until 2005.

Study 3: The results of a case-control study investigating the role of driving exposure as a potential confounder in the crash to driver education relationship are presented. For this study, a telephone survey of 4,181 Novice drivers was conducted. Two groups of cases were defined for this study: 1) drivers who had been involved in any crash (liable or non-liable) during their first six months of Novice driving, and 2) drivers who had been involved in at least one liable crash. The control subjects were defined as Novice drivers who had been involved in no crashes during their first six months of driving.

A detailed evaluation of the implementation of GLP was included in the Year 2 report, and therefore is not reiterated here. Updated statistics concerning the status of GLP participants (not just those in the study cohorts) and their progress through the program to December 31, 2001 are included.

Section 3. Program Description

The Graduated Licensing Program (GLP) was introduced in British Columbia (BC) on August 1, 1998. GLP targets new drivers regardless of age. GLP is an incremental approach to driver licensing whereby drivers gain experience gradually under conditions that expose them to less risk then previous licensing methods. The program consists of three stages: a 6-month Learner stage, an 18-month intermediate or Novice stage, and a Full Privilege licence stage. Removal of restrictions imposed during the various stages occurs as the driver gains experience and meets certain qualifications.

Prior to the introduction of GLP in BC, approximately one in five new drivers were involved in a crash during their first two years on the road. ICBC introduced graduated licensing in August 1998 to reduce the incidence of crashes involving new drivers.

Objectives

The program's primary objective is to reduce the rate of new driver crashes (by 15%). A secondary objective is to reduce the severity and cost of new driver crashes.

The program was designed and the objectives were expected to be met through four intervening processes:

1. Improving the safe driving behaviours of new drivers.
2. Improving new driver skills.
3. Reducing exposure to risk for new drivers – particularly for Learner drivers.
4. Improving attitudes of new drivers towards safe driving.

During the minimum 6-month Learner stage the following restrictions are in place:

- a red "L" (Learner) sign must be displayed
- a licensed adult supervisor must be present
- only one passenger is allowed in addition to the supervisor
- no driving between midnight and 5 a.m.
- zero blood alcohol content (BAC)

Removal of most of the above driver restrictions occurs during the Novice driver stage. The driver restrictions for the minimum18-month Novice stage are:

- a green "N" (Novice) sign must be displayed
- zero blood alcohol content (BAC)

GLP drivers are subject to lower penalty point thresholds and receiving two violations may result in a prohibition from driving for one month. If convicted of additional violations, the new driver may be issued a longer prohibition period. The length of the Learner or the Novice stage is extended by the number of months the driver was prohibited from driving.

A driver who drinks and drives may receive an immediate 12-hour suspension or 24-hour prohibition, followed by a subsequent one-month prohibition for the first offence and a one-year prohibition for the second.

Applicants for commercial licences must hold a Class 5 licence; therefore, GLP drivers are not eligible to apply for a commercial licence.

A new driver must pass the Class 7/8 road test in order to progress from the Learner to the Novice stage, and must pass the Class 5/6 road test to exit GLP, receiving a Full Privilege licence. In Canada, only BC, Alberta and Ontario require drivers to pass a second test in order to become Full Privilege licence holders. However, unlike

Ontario where failure to become fully licensed within five years results in a loss of driving privileges (and a return to Learner status), BC Novice drivers can renew their Novice licence without penalty.

3.1 Program Implementation and Participation

GLP was developed and implemented in four phases as described below and depicted in Figure 1.

May 4, 1998 - GLP Transition Phase

Prior to the implementation of GLP there was a transition period from May 4 to July 31, 1998. Anyone receiving a Learner licence during this period was required to spend a minimum of three months as a Learner. The earliest exam date for these drivers was August 1, 1998 and upon passing the Class 7 or 8 road test, they received a GLP Novice licence rather than a Full Privilege licence.

August 1, 1998 – GLP Release 1

Implementation of GLP entry requirements for all new drivers took place during this release. GLP Learner and Novice restrictions were imposed, as were enhanced adjudication sanctions. In addition, driving schools began offering the newly developed curriculum for the ICBC-approved driver education. New drivers successfully completing an ICBC-approved GLP driver education course could apply to have their Learner stage reduced by three months.

A five-day training course for driver-training instructors wishing to teach GLP driver education was developed, and the first course was offered in July 1998. Driver-training instructors however, were not required to have completed the five-day course in order to teach an ICBC-approved GLP course until February 1, 1999.

A practice guide was published titled *Tuning Up*, *a manual for new drivers and their co-pilots*, and was included in the toolkits provided to GLP drivers when they received their Learner licences.

January 24, 2000 – GLP Release 2.1

Release 2.1 included the development and implementation of the advanced (Class 5/6) road test. All GLP drivers must pass this test to obtain a full privilege licence.

Fall, 2000 – GLP Release 2.2

This release brought about the publication of new safe driving guides for passenger vehicle drivers; *RoadSense for Drivers,* and motorcycle riders, and *RoadSense for Riders*, both available as of September 2000. The new guides are more detailed than the previous *Safe Driving* or *Safe Riding Guides* and provide a systematic "see-think-do" approach. The aim of the guides is to present drivers with common-sense strategies to deal with the various problems they are likely to encounter on the road and thereby produce a thinking driver.

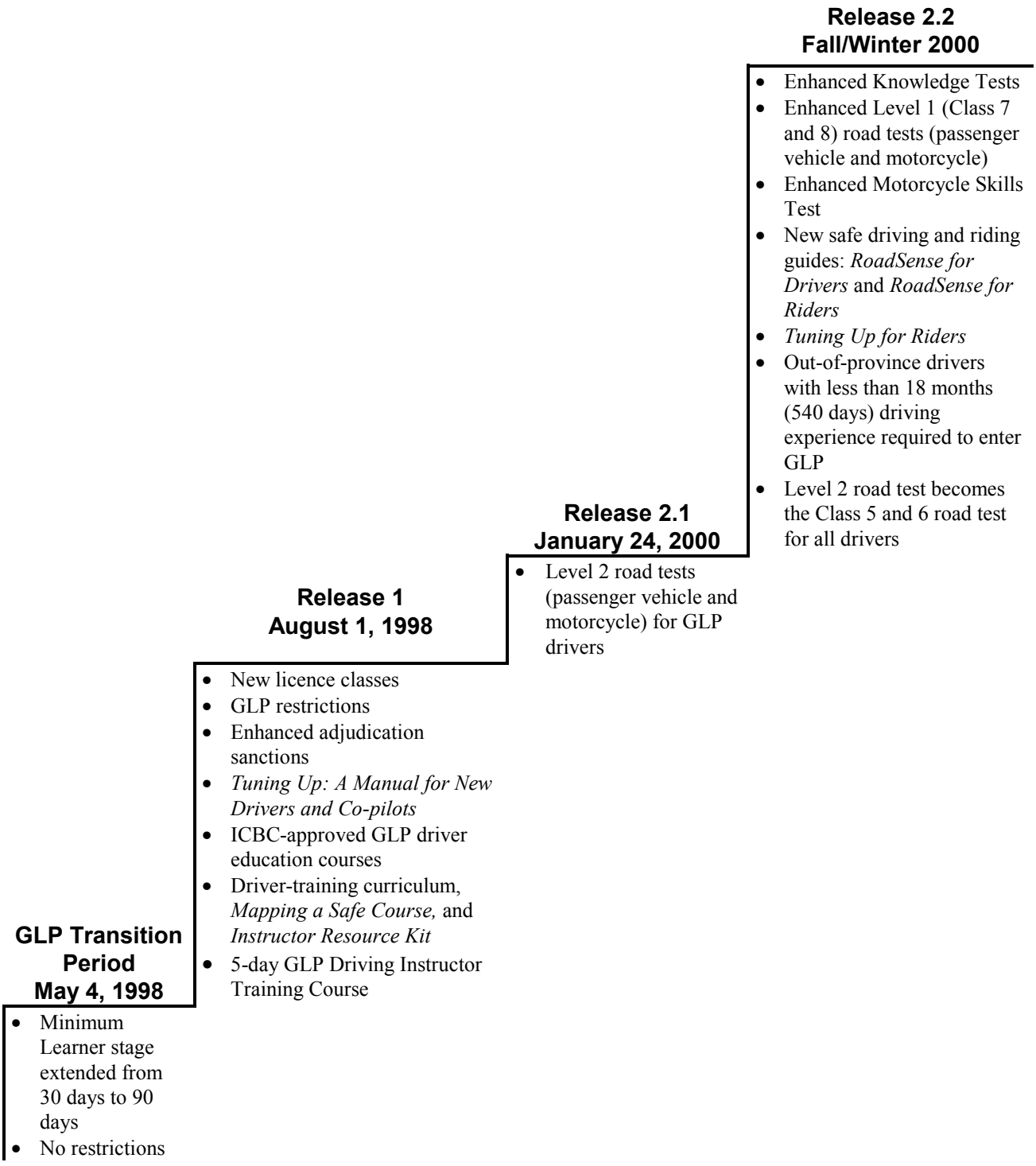
Implementation of the enhanced Knowledge Tests (passenger vehicle and motorcycle), took place on October 16, 2000, reflecting the content and approach of the *RoadSense* guides. Decision-making, rather than rote memory is required in order to pass the new tests.

As of November 27, 2000, drivers from out-of-province with less than 18 months of driving experience were required to enter GLP. In addition, the new Class 5/6 road tests became the entry test for anyone applying for a Class 5 passenger vehicle licence or a Class 6 motorcycle licence, not just GLP drivers. Enhanced Class 7 and 8 road tests were developed and implemented as the entry tests for Class 7 and Class 8 licences. In addition, there was an implementation of a revised motorcycle skills test.

The publishing and distribution of *Tuning Up for Riders* took place in December 2000.

With Release 2.2 all of the development work needed for GLP was completed and by December 2000 all components of the program had been implemented. Transition from project development to ongoing operational support, including driver examiner motorcycle road test training, was completed by June 2001.

Figure 1: GLP Implementation Timeline



3.2 Status of the Implementation Process

As part of the Year 2 Interim Evaluation, a process evaluation of the implementation of GLP took place. A description of this evaluation is provided in section 3.3 of this report (Year 2 Interim Evaluation – Part 1).

By December 2000, all of the program elements and business components of GLP had been successfully developed and implemented, and by June 2001 the program was fully transitioned from the project development team to ongoing operations.

Only one item of concern relating to the implementation of GLP remained outstanding after the Year 2 Evaluation was completed – verification of the successful implementation of the ICBC-approved driver education program. A preliminary assessment of the driver education course, completed in October 2000, identified concerns with respect to the extent to which the course was being delivered to the standards outlined in the *Mapping a Safe Course* curriculum. Although work continues towards improving course standards, a follow-up evaluation of the progress that has been made has not yet been conducted.

The following section provides an update on the extent of participation in GLP, and notes any changes in the age and gender distributions that occurred between August 1998 and December 2001.

3.2.1 GLP Participation

As of December 31, 2001, a total number of 174,551 new drivers had obtained a first Learner's licence under GLP. Of these, 111,432 (63.8%) had advanced to the Novice stage and, of these Novices, 7,952 (7.1%) had graduated to a Full Privilege Class 5 or 6 licence.

Another 37,302 drivers obtained a Novice licence between August 1, 1998 and December 31, 2001. These drivers entered BC from other jurisdictions, or obtained their Learner's licence before the implementation of GLP. Of these drivers, 4,988 (13.4%) had graduated to a Full Privilege licence by the end of December 2001.

The focus of this report is on drivers who began their licensing process in GLP.

3.2.1.1 New Learner Licences Obtained Annually

As has been seen in other jurisdictions, news of licensing changes in BC prompted a large increase (Table 1) in the number of people obtaining a Learner's licence in the months prior to the implementation of GLP.

Table 1: Learner Licences obtained by New Drivers*

Year	Licensing Program	Number	Number per Month
January 1, 1996 to December 31, 1996	Pre-GLP	60,399	5,033
January 1, 1997 to December 31, 1997	Pre-GLP	78,216	6,518
January 1, 1998 to July 31, 1998	Pre-GLP and GLP Transition	62,951	8,993
August 1, 1998 to December, 1998	GLP	15,555	3,111
January 1, 1999 to December 31, 1999	GLP	52,411	4,368
January 1, 2000 to December 31, 2000	GLP	55,443	4,620
January 1, 2001 to December 31, 2001	GLP	51,142	4,262

* Drivers who had never previously held a licence or Learner's permit

The increase began in 1997, but was particularly substantial in 1998 as GLP implementation came nearer. Many drivers who were eligible by age to apply for a Learner's licence prior to GLP did so. The average number of new drivers entering GLP each month has increased since the 1998 lows of about 3,100 per month (Table 1). However, it is still well below the Pre-GLP average monthly counts, even as far back as 1996. It is unknown at present when the average monthly counts will return to the levels seen prior to GLP.

Almost 80% of the drivers who obtained their first Learner licence in GLP by December 31, 2001 were 18 years of age or younger, and almost two-thirds (65.3%) were 16 year-olds (Table 2). In contrast, not quite half (48.7%) of the drivers who obtained their first Learner licence prior to GLP (between January 1996 and December 1997) were 16 years of age at the time their licence was issued, and only about 63% were 18 years of age or younger.

Two factors may be contributing to the younger age of GLP drivers. Firstly, many drivers who were old enough to obtain a Learner's licence in 1998, prior to the implementation of GLP, did so. Thus, the pool of older drivers was diminished in the months leading up to GLP. Secondly, the longer GLP Learner stage may be prompting new drivers to enter the system sooner. If earlier licensure is an important factor then, over time, the proportion of young new drivers should remain high relative to Pre-GLP levels. This will be re-examined at a future date.

Table 2: Age Distribution of New Driver Cohorts

Age at First Learners	Pre-GLP 1996-1997		GLP Aug-Dec 1998		GLP 1999-2001	
	N	%	N	%	N	%
16 Years	67,448	48.7%	10,690	68.7%	103,342	65.0%
17 Years	12,225	8.8%	868	5.6%	14,504	9.1%
18 Years	7,236	5.2%	521	3.3%	7,521	4.7%
19-21 Years	10,991	7.9%	896	5.8%	10,327	6.5%
22-24 Year	6,506	4.7%	495	3.2%	4,943	3.1%
25 Years or more	34,173	24.7%	2,085	13.4%	18,358	11.5%
Total	138,609	100.0%	15,555	100.0%	158,995	100.0%

3.3 GLP Implementation Studies Conducted to Date

Since the implementation of GLP in August 1998, there have been a number of telephone surveys and other studies done to monitor and evaluate the awareness, support and the early stages of the program's implementation.

Table 3 provides a brief description of the studies conducted to date.

Table 3: Other Surveys and Interim Evaluation Studies Conducted since GLP was Implemented

Surveys	**ICBC Monthly Survey** This monthly telephone survey consisted of a random sample of 300 licensed drivers and ICBC policyholders. GLP questions were included in the survey from June 1998 through January 1999. The purpose was to assess the public's awareness of GLP, awareness of new driver signs, and opinions about the types of driving behaviours should be included in an advanced road test.
	ICBC Quarterly Survey (Periodic Road Safety Survey) Implemented in the third quarter of 1998, this telephone survey consisted of a random sample of 300 to 600 licensed drivers. Telephone interviews were held nightly and the results were summarized on a quarterly basis. GLP questions were included from June 1998 through December 2000 to determine the public's attitude towards GLP, and later the public's support and awareness of GLP and awareness of new driver signs.
	Graduated Licensing Program Study – January 1999 This joint Research Services and Angus Reid study, implemented in January 1999, had the main purpose of gaining information about the new driver signs. This study also collected other information and covered three different survey groups: 1) 300 GLP Drivers (150 Learners and 150 Novices) – telephone interviews. Topics included: a) Compliance with displaying the sign and other GLP restrictions b) Functionality problems with the sign c) Enrolment in and cost of driver-training d) Use of *Tuning Up* 2) 240 members of the Driving Public – mall intercept interviews Topics included: a) awareness of the sign b) sign visibility c) self-report of any intent to modify driving behaviour when they see GLP drivers displaying the sign 3) 12 Police officers – fax-back questionnaire This survey solicited anecdotal feedback on officers' perceptions of compliance with GLP restrictions and their enforcement of GLP restrictions.

Surveys

GLP Novice Driver Study – October 2000

This telephone survey, developed jointly by the GLP Evaluation project team and Road Safety Research, with fieldwork provided by *McIntyre and Mustel*, took place in October 2000. It was conducted as an adjunct to the Year 2 Interim Evaluation, and the results were included in that report.

The main purpose of the study was to obtain information regarding New Driver driving patterns (exposure) in the Learner and Novice stage for those who had and had not been involved in crashes (both at-fault and not at-fault) and those who had and had not taken a GLP course. The samples are described below.

The survey also updated information gathered in the January 1999 study on compliance with GLP restrictions, and asked questions regarding amount and type of driver-education, when New Drivers planned to take the Level 2 road test, safe driving attitudes and awareness of consequences of breaching GLP licence restrictions.

Sample

A total number of 1,436 GLP New Drivers who had passed the Level 1 road test on or before July 31, 2000 and become Novice drivers took part in telephone interviews.

Using a stratified sampling method to obtain the study sample, two variables defined the strata:

- crash involvement: (1: at-fault; 2: not at-fault or fault not determined; and 3: no crash involvement)
- submission of a Declaration of Completion (DOC) (1: Yes, 2: No)

Each of the resultant six study groups was to have a sample size of 300 new drivers; however, due to limitations in the availability of drivers from the population of not at-fault or fault not determined crash group, there were sample size shortfalls for both the DOC - Yes (N=85) and DOC – No (n=156) members of this group. The sample size targets of 300 were met, or very nearly met, in each of the other four study groups.

Sign Pilot Study - October 1 to November 30, 1999

Development and pilot study of prototype signs came about in response to a number of complaints by GLP drivers about the "L" and "N" signs. The objective of the pilot was to test the signs in real Learner and Novice driving situations over a period of approximately eight weeks and obtain feedback as to the signs pilot participants liked best.

The signs piloted in this study included: the current magnetic sign, a reflective sign similar to the magnetic with a reflective coating, a semi-permanent adhesive decal, an easily removed cling vinyl, a light-weight plastic sign requiring some form of attachment, and a clear plastic pouch to be used as an alternative to the then existing suction cups as a means of attaching a sign.

Pilot participants

A total of 72 ICBC staff and family members in the Lower Mainland, Victoria and Prince George, who were GLP Learners or Novices, completed the pilot.

Process and Early Interim Evaluations	**Year 1 Interim Evaluation** This study developed the processes required for identifying drivers to compose the primary cohorts for the summative evaluations. In addition, this evaluation provided an initial testing ground for both the development of the processes needed to produce the programs, as well as protocols required for identifying and tracking the crash information of the drivers included in the study. At the time of the study, less than half of the drivers in the GLP cohort had graduated from the Learner stage to the Novice stage, and none of the GLP drivers had obtained a Full Privilege Licence. A preliminary comparison of Learner stage driver crashes in this early assessment demonstrated a 15% reduction in the GLP Learner driver crash rates relative to the Pre-GLP comparison group. The Executive Summary from the Year 1 Interim Evaluation is included as Appendix A of this report.
	Process Evaluation of the ICBC-Approved Driver Education Course A process evaluation completed in October 2000 appraised the driver-training industry's implementation of the ICBC-approved driver education course. Six driving school inspectors collected data through observation of in-class and in-car instruction, including interviews with school owners and instructors. The inspectors also administrated questionnaires to students, and provided a review of driving school assessment and the evaluation documents. A total number of 96 schools actively participated in the evaluation. Of this total, 62 schools were offering the approved course, while 34 schools were not. Of note, nearly half of the schools with approved courses demonstrated the principles, strategies and assessment practices reflecting the desired approach to driver education. In addition, there was wide variation in maintaining the principles, strategies and practices for implementation. Approximately 25% of the schools with an approved course scored below 60% on a scoring system designed to gauge adherence to the approved course approach. Although the results of the evaluation indicated that students were generally satisfied with the course, three areas of concern were identified: 1) The instructor implementation of the Learner-centred and outcomes-based approaches to driver-training needed improvement, 2) Instructors were issuing DOCs to students who had not successfully completed all of the requirements of the course, and 3) Instructors were not addressing driver attitudes. The study concluded that full implementation of the ICBC-approved driver education course had not yet been achieved. Recommendations were made for continued monitoring of the implementation of the approved driver education course, and that the basic instructor course be revised to provide instructors with a better grounding in driving attitudes and how they can be shaped and changed. The Executive Summary of the Preliminary Evaluation of the Approved Course is included as Appendix B of this report.

Process and Early Interim Evaluations	**Year 2 Interim Evaluation** This evaluation had three components. The primary purpose of the report was to describe and assess the phased implementation of GLP. The second purpose was to conduct a second interim assessment of the impact of GLP on the crash rates of new drivers. The third component of the evaluation was a Novice driver survey, used both to assess the driving attitudes, trends, and patterns of GLP Novice drivers and to explore issues relating to the driving exposure of GLP drivers who did or did not complete the approved driver education course. **Part 1 - Implementation**: GLP implementation occurred in 3 stages with full implementation completed by December 2000. Part 1 of the Year 2 report detailed the various components of the program including: timing of implementation, any challenges associated with implementation, participation levels, general compliance with program elements, and drivers' progress through the program. In addition to the conclusions concerning the implementation of the ICBC-approved course mentioned above, the primary conclusions from the Year 2 implementation assessment determined that: 1) A large number of new drivers applied for their Learner's licence prior to the implementation of GLP, and consequently this resulted in a significant drop in the number of drivers who entered GLP during 1998 through 2000. The drop in numbers also resulted in a shifting of the age distribution towards younger drivers in GLP. 2) Novice drivers were not progressing through the second level test to their full privilege license. As of December 2000, only 14% of Novice drivers who had become eligible to graduate from GLP had taken and passed their Class 5 or 6 road test. 3) Less than 1% of GLP licence holders obtained a motorcycle licence. 4) Compliance with Learner stage restrictions was high, except for the Passenger restriction. Only 41% percent of Learners surveyed reported compliance with the passenger restriction. 5) Initial pass rate on the Class 5/6 road test was low, but had reached the target of 50-60% within 6 months of implementation 6) GLP Learner drivers had a higher pass rate (67%) on the old Class 7/8 road test than drivers prior to GLP (about 60%). The new class 7/8 road test was implemented November 27, 2000 so it was too early to assess pass rates on the new test. 7) Awareness of the sanctions for breaching GLP requirements was low. 8) Only about half of the new drivers surveyed reported using the "Tuning Up" guide. Of the new drivers, and co-pilots, who did, most found the guide to be helpful.

Process and Early Interim Evaluations	**Year 2 Interim Evaluation - Part 2. Assessment of Crash Impact**: This study provided an update of the Year 1 evaluation, extending the follow-up period from 13 to 24 months. This evaluation compared the crash records of 45,811 GLP new drivers and 63,344 Pre-GLP drivers. Driver selection for the study was based on the issuance date of their first Learner's licence. The GLP study group included drivers who obtained their first Learner's licence between August 1, 1998 and July 31, 1999, and crash rates were between the issue date of their first learner's licence and December 31, 2001. The same process was used to select the Pre-GLP group of drivers, with their intake period being from August 1, 1996 through July 31, 1997. Crash rates for this group were based on crash involvements of the driver between their licence issue date and December 31, 1999. After adjusting for age and gender differences between the GLP and Pre-GLP cohorts, the GLP crash rate was 26% lower than that of the Pre-GLP group. Only about 77% of the GLP cohort had completed the Learner stage when the study was undertaken, compared to 90% of the drivers included in the Pre-GLP group. Consequently, the results were considered preliminary. The study findings suggested that most of the crash rate reductions was attributable to the extension of the Learner stage for GLP drivers. **Year 2 Interim Evaluation - Part 3. Driver-Training and New Driver Crash Rates** This part of the Year 2 Evaluation compared crash rates of drivers who submitted a Declaration of Completion (DOC) to those who did not submit a DOC. Approximately 18% of the GLP drivers included in the evaluation cohort submitted a DOC, and drivers in the DOC group had a pass rate on their first attempted road test that was much higher than those in the No DOC group (78% and 65%, respectively). After adjustment for age and gender differences between the groups of drivers, those who submitted a DOC had crash rates that were 92% higher than those who did not submit a DOC. As with the comparison of GLP to Pre-GLP drivers, much of the difference between the crash rates of DOC and non-DOC drivers was associated with the greater length of time spent in the Learner stage by drivers who did not submit a DOC. However, when restricted to Novice drivers only, the DOC group rate was still 22% higher than the No DOC group rate, and 10% higher after adjustment for differences in the length of the Learner stage. It was suggested that some of this difference could be due to greater driving exposure for the DOC Novice drivers. Drivers who took the approved may have been more highly motivated to drive, and hence may have been driving more (both before and after passing their Class 7/8 road test) than those who remained in the GLP Learner stage for six months or longer A second study explored some of the driving patterns and trends of GLP Novice drivers, as part of an assessment of driver-training. For this study, comparisons were made between GLP drivers who had been involved in a crash and GLP drivers who had not been involved in a crash. A stratified sampling approach assured sufficient numbers of DOC and No DOC participants. Consequently, submission of a DOC could not be assessed as a risk factor for new driver crashes. The results of the study, with respect to driving exposure were mixed. However, there was some indication that drivers who submit a DOC may engage in greater amounts and different types of driving than drivers who do not submit a DOC. Due to the exploratory nature of the study, the results were only suggestive. Further research in this area is required. The Executive Summary of the Year 2 Evaluation is included as Appendix C of this report.

Section 4. Purpose and Scope of the Evaluation

One of the main purposes of this evaluation is to assess the extent to which GLP is meeting its goal of reducing the rate of new driver crashes (by 15%). The focus is on the first three years of the program's operation. However, it should be noted that GLP was not fully implemented until the end of the year, 2000. The drivers included in this evaluation entered the program between August 1, 1998 and December 31, 1999. Consequently, they did not have access to some of the educational materials developed for new drivers and riders, nor to the newly developed Knowledge and Class 7/8 Road Tests. As well, the ICBC-approved driver education course was in its early stages of development and implementation, and did not become widely available until the early months of 1999. For these reasons, the evaluation is considered preliminary.

A second purpose of the evaluation is to assess the effectiveness of some of the components of GLP. In particular, the evaluation examines the impact of the extended Learner stage, and the Learner and Novice stage licence restrictions and sanctions, on the crash, violation and prohibition records of new drivers.

Clearly, the effectiveness of GLP depends, to some extent, on whether or not new drivers comply with GLP rules and restrictions; and compliance depends, at least in part, on the extent to which the rules and restrictions are enforced. Compliance is not an issue with respect to the minimum lengths of the Learner and Novice stages. Within the driver licensing system, processes have been established to ensure that the rules governing timelines and earliest exam dates are followed. It is an issue, however, with respect to the restrictions placed on Learner drivers, and to the lower penalty point thresholds applied to all GLP drivers. Although an assessment of true compliance is beyond the scope of this evaluation, an indication of compliance is sought through an examination of the characteristics of the crash involvements of new drivers. In particular, the frequency of Learner crashes that occurred: during restricted hours, with passenger profiles not matching the requirements, and those with alcohol identified as a contributing factor are examined. Changes in driving behaviours and enforcement of driving restrictions are assessed by examining the frequency of:

- Violation tickets issued for breaches of licence restrictions, and
- Sanctions imposed on drivers who exceed penalty point thresholds.

The third, and final, purpose of the evaluation is to examine the relationship between the crash involvements of new drivers and participation in driver education, with particular emphasis on participation in the ICBC-approved driver education course. Drivers who complete an ICBC-approved course can submit a Declaration of Completion (DOC) and reduce their Learner stage by up to 3 months. The offering of a reduction in the length of the Learner stage for drivers who complete the approved course is based on an implicit assumption that "driver education/training provides safety benefits equivalent to those that would have accrued from gaining experience under the restrictions imposed by the graduated licensing system" (Mayhew & Simpson, 1996, p. ix). The validity of this assumption will be investigated.

BC's driver training curriculum *Mapping a Safe Course* was built on a basis of practical as well as formal research (GLP Driver Training and Testing Team Transition Report, February, 2001). This curriculum provides a blueprint for building an ICBC-approved course and provides the goals and learning outcomes that describe what the new driver/rider is expected to achieve. The curriculum emphasizes the need to produce 'thinking' drivers and, at a high level, is based on the following four principles:

- A focus on driver responsibility and attitudes;
- A competency-based approach, focussed on what participants will be able to do at the end of the course

- A learner-centred approach, involving students in examination of their own values and attititudes;
- Integration of the theoretical and practical aspects of driver training

Approved courses must consist of a minimum of 16 hours classroom instruction and 12 hours in-car instruction. An additional 4 hours of discretionary time may be used for in-class or in-car instruction. Drivers must also log 30 hours of practise time.

One factor that may limit the conclusions that can be drawn from the evaluation of the ICBC-driver education curriculum is that it has not been evaluated since the preliminary evaluation done in 2000. At that time several concerns were raised with respect to the consistency with which the curriculum was being implemented to the standards defined in *Mapping a Safe Course*. Since that time considerable work has been undertaken by the industry and by ICBC's Driver Training and Assessment Standards department to improve implementation and delivery, but to date no formal evaluation has been undertaken to determine whether they are consistently being achieved. Consequently, any differences in outcomes observed between drivers who do or do not complete an ICBC-approved course may be due, at least in part, to inconsistency in the delivery of curriculum standards. Until a formal evaluation of the implementation and delivery of the course is undertaken, it will not be possible to remove this factor as a possible explanatory variable.

The following are the main research questions addressed in this evaluation:

1) Has GLP reduced the rate of all new driver crash involvements during the Learner stage, Novice stage, or over the entire follow-up period?

2) Has GLP reduced the rate of new driver involvements in casualty (fatal and injury) or property damage only crashes during the Learner stage, Novice stage, or over the entire follow-up period?

3) Has GLP reduced liable crash involvement rates of new drivers?

4) What effect does the GLP extended Learner stage have on the crash rates of new drivers?

5) Has GLP improved the safe driving behaviour of new drivers?

6) To what extent are driver prohibitions used to penalize unsafe driving behaviour?

7) Has completion of an ICBC-approved driver education course reduced the crash involvement rates of GLP drivers?

4.1 Definitions

For reference purposes, definitions of some common terms that are used throughout this document are provided in Table 4.

Table 4: Terms and Definitions

Term	Definition
Cohort	"A cohort is a group of people who have something in common and who remain part of a group over an extended period of time" (Dawson-Saunders, B and Trapp, R.G., 1990, p. 9). For example, in this document the common characteristic which defines two study cohorts is participation or non-participation in GLP.
Confounding Factors (or Confounders)	Confounding factors (confounders) are variables that contribute to producing results that are misleading. For example, age and mortality are known to be highly related. If the mortality rates of populations from two geographic areas are to be compared, but one population is much younger than the other, the association between area and mortality risk will be confounded by the association between age and mortality risk. In order to provide a clearer picture of the association between area and mortality risk, the differences in the age distributions of the two populations must be considered.
Declaration of Completion (DOC)	ICBC approved Driving schools, offering GLP driver education, issue a DOC to drivers who successfully complete a GLP driver education course. A new driver must submit a DOC to a Point of Service in order to apply for a three-month reduction in the Learner stage.
Follow-up Period	The period of time in which participants are tracked in a study. In this study, each individual driver is followed from the date they obtained a first Learner licence until either: 1) the end of the study period, 2) the last licence held became expired, 3) the last licence held was surrendered or cancelled, or 4) the driver became deceased – whichever came first. As new drivers could obtain their first Learner license at any time during the 12-month intake period, the amount of follow-up data will vary for each participant.
Full Privilege Licence	A licence that does not have any of the restrictions or conditions that are attached to GLP. In this document, this refers to a Class 5 passenger vehicle licence, a Class 6 motorcycle licence or Class 5/6-combination licence.
GLP Cohort	A new driver receiving a GLP Learner licence between August 1, 1998 and July 31, 1999. Only drivers with no known driving experience prior to August 1, 1998 are included in this group.
Approved GLP Driver-training Course	Based on the *Mapping a Safe Course* curriculum, this is a 32-hour course which consists of a minimum of 16 hours of in-class instruction, 12 hours of in-car instruction and 4 hours of discretionary time, which may be used for in-class or in-car instruction. Driver-training schools must have their GLP course approved by ICBC. Driver-training instructors must complete a 5-day course to have a GLP designation on their instructor licence and to teach a GLP course. New drivers completing this course (must also have 30 hours of logged driving practise) may apply to have the Learner stage reduced by three months.

TABLE 4 (Continued):

GLP Motorcycle Learner	Someone who holds a Class 7L and a secondary 8L. In GLP a new driver must first obtain a Class 7L prior to obtaining an 8L.
GLP Novice	Someone in GLP who has passed the Level 1 road test and is now in the Novice stage of the program (after successfully completing the GLP Learner stage) and holds a Class 7 passenger vehicle licence, a Class 8 motorcycle licence or Class 7/8 combination licence.
Intake Period	The period of time during which participants are accepted into a study. For example, in this evaluation, the intake period for the Pre-GLP cohort was from August 1, 1996 to July 31, 1997. For the GLP cohort, the intake period was August 1, 1998 to July 31, 1999.
Learner	Someone who holds a Learner licence.
Learner Follow-up Period	The amount of time study participants spent as Learner drivers. This would equate with the number of days (or years) to graduation into the Novice stage or, for those who did not obtain a Novice licence before the end of the study, the study end date.
New Driver	Someone who has never previously held a licence in BC or any other jurisdiction. All out-of-province drivers have been excluded from this group, as their experience is unknown.
Pre-GLP Cohort	A new driver receiving a first Learner licence between August 1, 1996 and July 31, 1997.
Rate	The rates used in this evaluation are calculated as the number of driver-incidents (crashes or violations) per driver-licensed year (or month). Driver-crashes represent the total number of crashes or violations that occurred during the study follow-up period in which a new driver was involved. One driver may contribute more than one crash to the total. *For example: the crash rate =* $\frac{\text{\# of driver-crashes}}{\text{total driver-years (or months) of licensure}} \times 100$
Study Group	The subjects included in the study. There may be more than one study group, and they may be defined based on their inclusion in a particular cohort (e.g., GLP or Pre-GLP groups) or as cases and controls (e.g., people involved in crashes and people not involved in crashes, respectively).
Study Period	The period of time during which the study was conducted. For example, the study period for the Pre-GLP cohort was from August 1, 1996 to December 31, 1999. For the GLP cohort, the study period was from August 1, 1998 to December 31, 2001.

Section 5. GLP and New Driver Crashes and Violations

As noted previously, the primary goal of GLP is to reduce the incidence and severity of new driver crashes. It is designed to achieve this goal by reducing exposure to risk and by improving safe driving behaviours. This section will describe the study that was undertaken to evaluate whether or not GLP has been successful and, if so, to what extent this success can be attributed to reduced risk exposure and/or to improved safe driving behaviour.

5.1 Method

The GLP evaluation of new driver crashes and violations was designed and conducted as a quasi-experimental cohort study with historical controls. Due to the province-wide implementation of GLP, it was not possible to conduct the study using a true experimental design, in the sense of a randomized controlled trial. A quasi-experimental design attempts to test and estimate the effect of a program, or other intervention, when the investigator does not have complete control over all factors that may threaten the validity of the study. Instead, the investigator attempts to control, either by the design of the study or through statistical adjustment, as many potentially confounding factors as possible. Four groups were identified for inclusion in this study: two new driver cohorts (a GLP cohort, a Pre-GLP cohort), and two experienced driver cohorts (corresponding in time to the GLP and Pre-GLP cohorts). An historical comparison group, such as the Pre-GLP cohort included here, does not provide a mechanism to control for changes in road safety initiatives (unrelated to GLP), enforcement, or other factors that may influence crash or violation rates. The two experienced driver groups were included in the study in order to provide an indication of how such (non-GLP) factors may have affected the violation and crash rates of the new driver cohorts.

5.1.1 Sample Selection Criteria

The GLP study cohort for this evaluation consists of all new drivers who obtained their first Learner licence between the implementation of GLP on August 1, 1998 and July 31, 1999. To account for seasonal variations in intake, the Pre-GLP cohort for this study is defined as all individuals who obtained their first Learner licence between August 1, 1996 and July 31, 1997. To avoid any potential problems that might be associated with drivers' anticipation of GLP, those who entered the system during the intervening year (August 1, 1997 through July 31, 1998) were not included in the study. The complete list of inclusion and exclusion criteria for the two study cohorts examined in this report is as follows:

GLP New Drivers

All new drivers who obtained their first Learner licence between August 1, 1998 and July 31, 1999.

This study group does not include:

- Out-of-province drivers
- Any driver who received a Full Privilege licence without first receiving a GLP Learner and Novice licence

1998_99 Experienced Drivers

To avoid potential overlap between the 1996_97 and 1998_99 experienced driver groups, only drivers who turned 25, 26, 35, 36, 45, or 46 on a birth date occurring between August 1st and July 31st of each time period of interest were selected. Thus, the 1998_99 experienced driver group included all drivers who turned 25, 26, 35, 36,

45, or 46 on a birth date occurring between August 1, 1998 and July 31, 1999 and who:

- Had no out-of-province indicators
- Had no GLP exposure
- Held a Class 5, 6, or 5/6 licence for at least 3 full years prior to the birth date that placed them in the cohort
- Had not obtained a commercial class licence during the period of the study
- Was not a member of the 1996_97 Experienced driver cohort

Pre-GLP New Drivers[1]

All new drivers who obtained their first Learner licence between August 1, 1996 and July 31, 1997.

This study group does not include:

- Out-of-province drivers who obtained Learner licences between August 1, 1996 and July 31, 1997
- Any driver who received a commercial vehicle licence (class 1 to 4) as their first licence

1996_97 Experienced Drivers

All drivers who turned 25, 26, 35, 36, 45, or 46 on the birth date that fell between August 1, 1996 and July 31, 1997 and who:

- Had no out-of province indicators
- Had no GLP exposure
- Held a Class 5, 6, or 5/6 licence for at least 3 full years prior to the birth date that placed them in the cohort
- Had not obtained a commercial class licence during the period of study

5.1.2 Data Sources

Five automated data systems from the Insurance Corporation of British Columbia (ICBC) were used to construct the study databases. The Driver Licensing System (DLS) was used: to identify drivers for inclusion in the study, in specifying the variables to use in describing the characteristics of the new driver cohorts, and to identify driving prohibitions and suspensions. The Driver Training School System (DTSS) was used to identify drivers who submitted a Declaration of Completion (DOC). The Traffic Accident System (TAS) and the ICBC Business Information Warehouse Claims (BIWC), were used to identify crashes in which the new drivers had been involved, as well as the benefits paid out for their crash claims. The crash data identified from these two sources were each analyzed separately. The Contraventions System was used to identify motor vehicle related violations.

[1] It should be noted that some (N=2,515) drivers in the Pre-GLP group subsequently obtained a GLP licence during the period in which the records of Pre-GLP drivers were examined (to December 31, 1999). Only information relevant to the tenure of their Pre-GLP licence was included in the study.

Driver Licensing System (DLS)

The Driver Licensing System is a relational database that stores information on every driver licensed in the province of British Columbia. It includes information on licences issued, the status of drivers' licences (e.g., normal, suspended, on hold, etc.), as well as information on any tests taken, the types of licences issued, and the nature and time-lines of any driving prohibitions or licence suspensions. The driver-related variables extracted from the DLS for use in the present study included the following driver information: birth date, gender, licence number, date of obtaining a first Learner licence, and the date of passing a first road test. Additional extracted information included, in the case of the Pre-GLP group or a Novice driver, for the GLP cohort, the date of becoming Full Privilege driver. Driving prohibition or suspension data extracted included: suspension cause, start date, and reinstatement date.

Driver Training School System (DTSS)

This system includes driving school data and DOC data. DOC's are submitted by drivers who successfully complete an ICBC-approved driver education course. The name of the driving school and the date of DOC submission are included in the system.

Traffic Accident System (TAS)

TAS contains police-reported crash data. Motor vehicle collisions are reportable in British Columbia if they result in: personal injury or death, or aggregate property damage in excess of $1,000 ($600 in the case of a motorcycle). However, crashes involving property damage only are determined to be reportable based primarily on police estimates of the amount of damage, which may not be accurate. Moreover, in 1996, many police agencies changed their standards or practices for collision reporting. This has resulted in fewer reported collisions, particularly those involving only property damage or minor injuries. Consequently, the number of new driver collisions reported from TAS will likely underestimate the actual number of crashes experienced by drivers. TAS is however, the primary data source for information concerning fatal crashes.

Business Information Warehouse – Claims (BIWC)

Due to the under-reporting of non-fatal crashes in TAS, claims crash incident data was extracted from the BIWC. This data provided a primary source for identifying new driver crashes, particularly those not involving a fatality. These incidents have been compiled from insurance claims reports. Consequently, although more crashes, specifically more minor crashes, are reported as a claim than those reported by police, the self-reported data might not be as reliable. The claimant might not accurately remember all the details of the crash or, the claimant may even alter details somewhat in order to present their case in a more favourable light. In addition, some details of the crash reported in TAS (such as the number and age of passengers in the vehicle and if alcohol was involved) are not captured in the claims reports.

Unfortunately, although more crashes are reported in BIWC than in TAS, it still does not provide a complete census of crashes. Individuals involved in crashes may elect not to report a claim, in order to avoid an increase in insurance premiums or other potential repercussions. Consequently, and because more detailed information is available from TAS, both data sources were used in analysis of the crashes. This provides a more complete picture of the total crash experience of new drivers than would be possible if utilizing only one source.

The BIWC data were used to identify which drivers were determined to be responsible for their crashes. In multiple vehicle crashes, 100% responsibility is assigned: when it is clear that one of the drivers failed to comply

with a section of the Motor Vehicle Act, and there is no evidence that there was contributory negligence by the other driver(s). In cases where there is evidence that more than one driver was negligent, the division of responsibility may be determined by reference to case law for similar fact crashes. In single vehicle crashes, responsibility is almost always assigned to the driver. For the purposes of the present study, drivers assigned 50% or more responsibility for the crash were categorized as "liable".

Contraventions

This system contains information relating to violations. Violation tickets are submitted for data entry by police officers. The data is updated as new information concerning the status of the violation ticket is received. Only those tickets issued for violations under the *Motor Vehicle Act*, the *Motor Vehicle Act Regulations*, or *Criminal Code*, and identified as having a guilty status, were included in this evaluation. All violation section codes were updated to conform to the 1997 *Revised Statutes and Consolidated Regulations of British Columbia* (and subsequent updates).

5.1.3 The Study Samples

A total number of 112,508 new drivers (67,086 Pre-GLP and 45,422 GLP) were eligible for inclusion in the study. Upon examination of each driver's record, a study end date was established based on the earliest of the following criteria:

- December 31st of the cohort follow-up year (2001 for GLP, 1999 for Pre-GLP),

OR

- The termination date (due to expiry, cancellation or, for the Pre-GLP group, the issuance of a GLP licence) of the last active licence held by the driver during the study period,

OR

- The date of death for drivers who died during the study period (In a few cases it was not possible to obtain an actual date of death. In these instances, the date used was the last day of the year in which the driver died).

OR

- The surrender date for those drivers who surrendered their license during the study period. (Using the surrender date as the end date, even if the driver was issued a subsequent licence, was done because the surrender may have been due to a move out of the province and consequently a different licensing experience).

Once the drivers' file was constructed, it was merged, (based on the driver's licence number) with the Contraventions, BIWC, and TAS data tables. All crashes and violations recorded from the date each driver first obtained a Learner licence to the end of each driver's study end-date were extracted for inclusion in the study.

For the purposes of this evaluation, all drivers who passed a first road test and obtained an "Original" licence were categorized as Novice drivers. For GLP drivers, the first "Original" licence issued is a Novice licence. For

Pre-GLP drivers, the first "Original" licence issued is a Full Privilege licence. In both cases, the first "Original" licence signals the first time drivers are permitted to drive unsupervised. GLP drivers cannot obtain a Full Privilege licence, however, until they pass a second road test. For the purposes of the analyses described in this report, no separate category was defined for GLP Full Privilege drivers. Only a small percentage (15%) of the GLP cohort graduated to full privilege status before the end of the study period, and the amount of follow-up available for that group was very limited. Consequently, the number of incidents counted for the GLP Novice driver category includes those that occurred at any time beginning after issuance of the Novice class licence until the end of the study period, even if they had graduated to Full Privilege status prior to the end date. An assessment of the effect of the second road test, and subsequent achievement of a Full Privilege licence, will be undertaken at a later date.

In addition to the samples selected for the GLP and Pre-GLP groups, a total number of 404,558 drivers were selected into the two Experienced Driver groups, (217,054 in the 1998_99 group and 187,504 in the 1996_97 group). Crash and violation records were extracted for these two groups in essentially the same manner as was used for the new driver groups. However, the driver's birth month and day in their cohort year were used, instead of the first Learner licence date, as the starting point for counting eligible crashes, violations, and driver-time.

5.1.4 Statistical Analysis

Crashes and violations were analyzed in a series of steps. Driver, violation, and crash characteristics of the two study groups were compared using Student's T-Tests (for the continuous variables) and Chi Square tests (for the categorical variables). New driver crash and violation rates were calculated, by dividing the total number of incidents experienced by the new drivers in each cohort by the total number of licensed driver-years they had accumulated during the study period[2]. In order to compare rates between the study groups, relative risks (e.g., the crash rate for GLP drivers divided by the crash rate for Pre-GLP drivers) were compared using Poisson regression (Kleinbaum, Kupper, and Muller, 1998) analysis. Poisson regression analysis is appropriate for data involving counts (e.g., number of crashes) and can take into account the varying lengths of follow-up time that each individual contributes to the rate denominator (i.e., licensed driver-years). Poisson regression also permits the inclusion of more than one predictor variable in the analysis model enabling adjustment for potential covariates or confounders such as age, gender, and Learner driver-time.

In addition to overall crash and violation rates, Learner rates (number of Learner related incidents divided by number of years of driving as a Learner) and Novice rates (number of Novice related incidents divided by number of years of driving as a Novice) were compared.

Crash rates were also computed for drivers during their first two years of driving by: age, gender, percentage of responsibility, and severity. The crash and violation rates of Novice drivers during their first two years of Novice (unsupervised) driving were also examined.

[2] With the introduction of GLP the Learner licence term was extended from a 6-month period to a 12-month period. Consequently, Pre-GLP drivers who did not renew their Learners licence after their initial term were, by virtue of the licensing regulations in place at the time, calculated to have a 6-month shorter actively licensed period than the GLP drivers who chose not to renew. It is unlikely that drivers in either of these groups were very active, but due to the licensing system, the number of days assigned to the Pre-GLP cohort would be biased towards shorter time spans. This in turn would tend to bias Pre-GLP crash rates to appear higher than they would if the licensing term was a full year. To investigate the magnitude of this potential bias, crash rates for Pre-GLP drivers were calculated twice: once using the actual licensed time for each driver, and once using an adjusted 12-month term.

In analyses involving potential covariates or confounders, adjusted rates and relative risks were computed from the results of the Poisson regression models. The mean values of each of the independent variables included in the final models were used to calculate the adjusted rates. Likelihood ratio-based 95% Confidence intervals were computed for the relative risks, and approximate 95% Confidence intervals were computed for both the crude and adjusted rates (Public Health Network, 2003). All of the analyses were conducted using SAS Version 8 (1999) statistical software.

5.2 New Driver Characteristics

5.2.1 Age and gender

The mean age of GLP drivers when they obtained their first Learner licence was significantly (P<0.0001) lower (Mean = 19 years, SD=6.9 years) than the mean age of drivers in the Pre-GLP group (Mean=22 years, SD=9.6 years). In both groups however, the age range of new drivers was broad, with the oldest new drivers in each group being 79-81 years old.

As shown in Table 5, the percentage of 16 year-old new drivers in both study groups was high. However, the percentage of 16 year-old new drivers in the GLP group (68%) was considerably higher than in the Pre-GLP group (48%). Conversely, the percentage of new drivers who obtained their first Learner licence when they were 25 years of age or older was lower in the GLP group (13%), than in the Pre-GLP group (25%). The association between age and study group membership was statistically significant (P<0.0001).

Table 5: Distribution by Age at First Learner Licence

Age in Years	Pre-GLP		GLP	
	N	(%)	N	(%)
16	32,398	(48.3)	30,762	(67.7)
17	5,965	(8.9)	2,905	(6.4)
18	3,584	(5.3)	1,671	(3.7)
19 – 21	5,318	(7.9)	2,847	(6.3)
22 – 24	3,134	(4.7)	1,461	(3.2)
25 or More	16,683	(24.9)	5,775	(12.7)
Age Unknown	4	(0.0)	1	(0.0)
TOTAL	67,086	(100.0)	45,422	(100.0)

No differences were observed between the two cohorts with respect to gender. Approximately 50% of the new drivers in both study groups are female. However, in both groups a greater (P<0.0001) proportion of males than females obtained their Learner licence at age 16, (Table 6), while a higher percentage of females than males obtained their first licence when they were 25 years or older. At least two factors may have contributed to the

younger age distribution of the GLP cohort. Firstly, there was the large number of new drivers who entered the licensing process just prior to implementation of GLP. These drivers would have to have been 16 or older prior to obtaining their Learner permit and, therefore would have reduced the number of older drivers in the initial GLP population. Secondly, it may be that more young drivers are entering GLP as soon as they are eligible because of the longer time-period involved in getting to a Full Privilege licence. An examination of the age characteristics of new drivers who entered GLP in 2000 and 2001 indicates that the percentage of 16 year old new drivers has dropped only slightly to 64%. It is too soon to determine to what extent the shift in the age distribution is due to the depletion of the age-eligible pool or to earlier licensure. These factors have been identified for further investigation in future studies.

Table 6: Distribution by Age and Gender

Age in Years	Pre-GLP				GLP			
	Males		Females		Males		Females	
	N	%	N	%	N	%	N	%
16	17,135	53.1	15,261	43.8	16,693	73.9	14,066	61.6
17	3,065	9.5	2,900	8.3	1,564	6.9	1,341	5.9
18	1,776	5.5	1,807	5.2	813	3.6	858	3.8
19 – 21	2,261	7.0	3,055	8.8	1,207	5.3	1,640	7.2
22 – 24	1,209	3.8	1,925	5.5	474	2.1	987	4.3
25 or more	6,801	21.1	9,880	28.4	1,841	8.2	3,934	17.2
All Ages	32,247	100.0	34828	100.0	22,592	100.0	22,826	100.0

Note: 15 drivers (11 Pre-GLP and 4 GLP) are not included because Age or Gender information was not available

5.2.2 Length of Time Spent in the Learner Stage

The minimum Learner stage for GLP drivers is six months. This stage can be reduced by up to three months, providing the new driver completes an ICBC-approved GLP driver education course. Prior to GLP, the minimum Learner stage was 30 days. On average, the length of the Learner stage for the GLP cohort was almost 8 months and about 4 and a half months for the Pre-GLP cohort (Table 7).

Table 7: Months* of Learner Follow-up by Study Group

Length of Learner Stage (in Months)	Pre-GLP	GLP
Median	4.6	7.7
Minimum	0.9	0.2
Maximum	41.0	41.5

**One Month = 30 Days.*

5.2.3 Characteristics of drivers who completed the Learner Phase during the Study Period

During the study period for each cohort, 56,741 (85%) of the 67,086 members of the Pre-GLP group and 38,635 (85%) of the 45,422 members of the GLP group successfully completed the Learner phase and obtained their first original licence. As noted previously, Pre-GLP drivers who passed the road test at the end of the Learner phase obtained a Full Privilege licence, whereas GLP drivers obtained a Novice licence. For the purposes of this evaluation however, all of these drivers are referred to as Novice drivers.

As might be expected, due to the extension of the minimum length of the Learner stage for GLP Learners, a higher percentage of the GLP cohort (23%) compared to the Pre-GLP cohort (1%) completed the Learner phase (Table 8) in the minimum amount of time (30 days, for the Pre-GLP group; 90 to 180 days for the GLP group). However, a much greater percentage (77%) of the Pre-GLP cohort had graduated from the Learner stage within 6 months compared to those from the GLP cohort (23%).

Table 8: Length of Learner Stage (in days) for Drivers who Passed their First Road Test and Advanced to the Next Licensing Stage*

Length of Learner Stage	Pre-GLP		GLP	
	N	%	N	%
30 days or less	566	1.0	0	0.0
31 – 90 days	20,769	36.6	595	1.5
91 days – 180 days	22,420	39.5	8,147	21.1
181 days – 360 days	8,425	14.9	23,239	60.2
361 days – 720 days	4,554	8.0	5,060	13.1
720 days or more	7	0.0	1,594	4.1
Total New Drivers	56,741	100.0	38,635	100.0

* *Full Privilege for Pre-GLP and Novice for GLP*

The age and gender distribution of the drivers who completed the Learner phase within the study period are shown in Tables 9 and 10.

Table 9: Age distribution of Novice Drivers

Age in Years	Pre-GLP		GLP	
	N	(%)	N	(%)
16	24,704	(43.5)	20,903	(54.1)
17	7,869	(13.9)	7,195	(18.6)
18	3,783	(6.7)	2,780	(7.2)
19 – 21	4,664	(8.2)	2,658	(6.9)
22 – 24	2,266	(4.0)	1,084	(2.8)
25 or More	13,455	(23.7)	4,015	(10.4)
TOTAL	56,741	(100.0)	38,635	(100.0)

As shown in Table 9, a higher percentage of Pre-GLP compared to GLP drivers were 25 years of age or more when they successfully completed the Learner phase and became Novice drivers. Conversely, a higher percentage of GLP drivers were 16 years of age when they obtained their Novice licence. The association between Novice age and study group membership was statistically significant (P<0.0001).

Table 10: Gender* Distribution of Novice Drivers

Gender	Pre-GLP		GLP	
	N	(%)	N	(%)
Female	28,617	(50.4)	18,714	(48.4)
Male	28,118	(49.6)	19,918	(51.6)
TOTAL	56,735	(100.0)	38,632	(100.0)

* *Gender was not recorded in the Drivers database for 6 Pre-GLP drivers and 3 GLP drivers.*

The association between gender and study group membership was also statistically significant (P<0.0001), with the GLP group having a higher percentage of males completing the Learner phase than the Pre-GLP group (Table 10). However, the observed differences between the two distributions were relatively small in magnitude.

5.2.4 Characteristics of drivers who graduated from GLP during the Study Period

A total number of 6,803 (15%) of the GLP new drivers graduated to a Full Privilege licence during the study follow-up period. The age and gender distribution of the graduates is provided in Table 11. The majority (about 80%) of both males and females who obtained their Full Privilege licence before the end of the study period were 17 or 18 years of age.

Table 11: Age and Gender distribution of GLP Full Privilege Drivers

Age in Years	Females		Males	
	N	(%)	N	(%)
17	261	(10.0)	452	(10.8)
18	1,730	(66.1)	2,815	(67.2)
19–21	386	(14.8)	632	(15.1)
22–24	61	(2.3)	75	(1.8)
25 or More	178	(6.8)	213	(5.1)
TOTAL	2,616	(100.0)	4,187	(100.0)

5.2.5 Summary of New Driver Characteristics

It is clear from the foregoing analysis that the two study cohorts differ with respect to their age and lengths of Learner stage. The reasons for the age differences between the cohorts are not known for certain, but two possibilities have been suggested. Firstly, there may have been a reduction in the population size of older new drivers due to the large numbers of age-eligible drivers who chose to obtain their first Learner licence prior to GLP implementation. If so, there would have been proportionately fewer older drivers left for inclusion in the study cohort. Secondly, there may have been an actual increase in the number of drivers aged 16 or 17 who obtained a Learner licence. Young drivers who, before GLP, may have waited to obtain their first Learner licence until they were a little older, may have been prompted to obtain their licence sooner, after GLP, because of the longer time it would take to obtain their Full Privilege licence. Regardless of the reasons, given the well-documented relationship in recent literature correlating age and crash risks, comparisons of the crash rates observed in the two study groups will have to adjust for the potentially confounding effects of this age-to-crash association. Among Novice drivers, a difference between the groups was also detected with respect to their gender distributions. Therefore, all analyses of crash rates will include adjustments for the potentially confounding effects of both age and gender. The influence of these factors on violation rates will also be examined. As well, adjustments for varying lengths of follow-up, both overall and during the Learner and Novice stages, will be required.

There is no direct comparison group for GLP Full Privilege drivers. Unlike Pre-GLP drivers, GLP drivers must pass a second road test before obtaining their Full Privilege licence. Due to the small number of drivers who graduated from GLP during the time-period included in this evaluation, only descriptive information on this group is provided. However, in the analysis of new driver crashes, all GLP drivers who obtained a Novice licence (whether they subsequently graduated to Full Privilege status or not) are included in the Novice group.

5.3 Characteristics of New Driver Crashes – Based on BIWC Crash Incidents

The following section reports on selected characteristics of the crash incidents involving new drivers in each of the study groups. These characteristics were examined for two reasons. Firstly, to ascertain if GLP drivers had different types of crashes than Pre-GLP drivers and secondly, to determine if there had been any changes in the frequency of crashes in contravention of GLP restrictions. The following specific crash characteristics were

compared across the study groups: crash severity, percentage responsibility, alcohol involvement, time of day when the crash occurred, and the passenger profile. Average amounts of claims paid per new driver-involved crash incident were also compared. As noted earlier, crash information was obtained from two data sources: BIWC incidents and TAS police reported crashes. The BIWC data was used to explore questions relating to the severity, liability, and costs of crashes; the TAS data was used to explore alcohol involvement, time of day and passenger issues in the crashes of new drivers.

5.3.1 Crashes Involving at Least One New Driver

Crash Type

During the time-period studied in this evaluation, a total number of 61,070 crash incidents were identified in which at least one new driver was involved (37,463 involving Pre-GLP and 23,607 involving GLP drivers). As shown in Table 12, approximately 25% of the new driver crashes in both groups involved a casualty (fatality or injury).

Table 12: Distribution of Crashes Involving at Least One New Driver by Type of Crash

Crash Type	Pre-GLP		GLP	
	N	%	N	%
Fatal	53	0.1	32	0.1
Injury	9,202	24.6	5,609	23.8
Material Damage Only	28,208	75.3	17,966	76.1
Total Crashes	37,463	100.0	23,607	100.0

Crash Costs

Table 13 shows the average (mean and median) claims costs incurred by the crashes involving at least one new driver in the GLP or Pre-GLP groups. The Median is the more meaningful measure of central tendency or average value than the mean in describing claims costs, because it is not as sensitive to extreme values. The median reflects the value that separates a sample in two: 50% having values below the median and 50% with values above the median. As the cost data are highly skewed by extreme values, tests of differences between the means were not considered appropriate for testing the significance of the differences between the two groups. Instead, the data were analyzed using a method (Wilcoxon Rank Sum test) that evaluates only whether there was a significant shift upwards or downwards in the distribution of crash costs. These tests revealed no statistically significant differences between the GLP and Pre-GLP groups with respect to the claims costs for Fatal crashes ($P<0.65$). However, the GLP group was found to have significantly higher Injury ($P<0.03$) and Property Damage Only crash costs ($P<0.0001$). However, the actual magnitudes of the average cost differences were relatively small. It should be noted that the costs reported in Table 13 have not been converted into current dollars for a common year. However, with annual inflation rates that varied between only 0.7% and 1.9% (Statistics Canada, 2003), over the time-period studied, it is unlikely that this would account for the differences observed[3].

Table 13: Average Costs per New Driver Crash

	Pre-GLP				GLP			
	PDO (n=28,208)	Injury (n=9,202)	Fatal (n=53)	All Crashes (n=37,463)	PDO (n=17,966)	Injury (n=5,609)	Fatal (n=32)	All Crashes (n=23,607)
Mean	$1,852	$27,949	$370,195	$8,783	$2,086	$26,148	$232,553	$8,116
Median	$578	$12,327	$106,249	$1,265	$768	$13,208	$89,063	$1,473
Standard Deviation	$3,721	$96,958	$683,844	$57,268	$3,711	$90,491	$408,532	$48,458
Minimum*	-$1,068	-$2,209	$1,342	-$2,209	-$1,443	-$200	$0	-$1,443
Maximum	$199,188	$4,301,664	$2,899,363	$4,301,664	$75,000	$3,231,983	$1,941,700	$3,231.983

** Minimum amounts paid show negative values due to recovered benefit amounts (for example, due to payments from another source).*

5.3.2 New Drivers Involved in at least One Crash

The total number of new drivers involved in the 61,070 crash incidents was 41,005 (24,605 drivers in the Pre-GLP group and 16,400 in the GLP group). Table 14 shows the number of new drivers by the number of crashes in which they were involved during the study period. The distribution of drivers involved in crashes was very similar in both groups. The majority (>60%) of drivers had not been involved in any crashes, while only few (<5%) had been involved in 3 or more crashes.

[3] A calculation was done to get an estimate of the effect of inflation on the reported costs. In this calculation the median costs incurred by the GLP group were converted to 1999 dollars, using a 3% discount rate. The reduced the median amount to $1435, for a total dollar reduction of only $43. The reduction did not affect the statistical significance of the difference between the Pre-GLP and GLP crash incident costs.

Table 14: Number of New Drivers and the Number of Crashes in which they were involved

Number of Incidents	Pre-GLP Drivers		GLP Drivers	
	N	%	N	%
None	42,481	63.3	29,022	63.9
1	15,655	23.3	10,953	24.1
2	5,888	8.8	3,758	8.3
3	1,985	3.0	1,179	2.6
4 or more	1,077	1.5	510	1.2
Total Number of New Drivers	67,086	100.0	45,422	100.0

5.3.3 New Driver Crash Involvements

For the calculation of new driver crash rates, the number of new driver crash involvements was used. These counts include multiple incidents involving the same new driver as well as single incidents involving more than one new driver.

The total number of new driver crash involvements was 62,584 (38,317 Pre-GLP and 24,267 GLP driver crash involvements). Table 15 shows the distribution of new driver crash involvements by the type of licence held at the time of the crash.

Table 15: Distribution of New Driver Crash Involvements by Licence Stage

Licence Stage	Pre-GLP		GLP	
	N	%	N	%
Learner	1,175	3.1	1,234	5.1
Novice	37,142	96.9	23,033	94.9
Combined	38,317	100.0	24,267	100.0

Percentage Responsibility for Crash

Of the 62,584 new driver crash involvements counted during the study period, 37,267 (43.6%) of the new drivers were assigned a percentage responsibility of 50% or more (liable). Although a greater percentage of GLP (60.7%) than Pre-GLP (58.8%) drivers were classified as liable for the crash, the difference was small.

The analysis of liable crashes for Learner and Novice driver crash involvements followed a very similar pattern. Only small differences were observed between the Pre-GLP and GLP groups (Table 16). However, the proportion of liable crashes reported for Learner drivers (in both study groups) was slightly higher.

Table 16: Distribution of New Driver Crash Involvements by Liability and Licence Stage at the time of the Crash

Licence Stage	Liability	Pre-GLP		GLP	
		N	%	N	%
LEARNER	Liable	776	66.0	830	67.3
	Not Liable	391	33.3	374	30.3
	Liability not Assigned	8	0.7	30	2.4
	TOTAL	1,175	100.00	1,234	100.0
NOVICE	Liable	21,771	58.6	13,890	60.3
	Not Liable	14,983	40.3	8,210	35.6
	Liability not Assigned	388	1.0	933	4.1
	TOTAL	37,142	99.9	23,033	100.0
COMBINED	Liable	22,547	58.8	14,720	60.7
	Not Liable	15,374	40.1	8,584	35.4
	Liability not Assigned	396	1.0	963	4.0
	TOTAL	38,317	99.9	24,267	100.1

5.4 Characteristics of New Driver Crashes – Based on Police Reported Crashes

A total of 13,570 crashes involving at least one new driver were reported in TAS (8,000 crashes involving drivers in the Pre-GLP cohort, and 5,570 crashes involving drivers in the GLP cohort). As mentioned earlier, the substantial underreporting of crashes that occurs in TAS renders this data source somewhat limited in value for the purposes of this evaluation. Primarily, this data source will be used to examine the frequency of fatal crashes, and to explore the extent to which crashes involving GLP Learner drivers reflect compliance with Learner stage restrictions. TAS is the only data source which provides information on alcohol involvement and passenger configurations.

5.4.1 Crash Type

As with the claims crash incidents, the distribution of police-reported crashes by type were very similar for both the GLP and Pre-GLP groups (Table 17). However, crashes reported in TAS include only those with police-estimated property damage greater than $1000, so the proportionate breakdowns by type are not comparable between the data sources. With respect to Fatal crashes, the counts obtained in TAS are very similar to the counts obtained from the claims data base (BIWC). Three additional fatal crashes (in the Pre-GLP group) were obtained from the claims data base. These may be the result of different definitions of what constitutes a fatal crash between the data sources, or it could be that the crashes occurred somewhere other than in BC.

Table 17: Distribution of Police Reported Crashes by Type of Crash

Crash Type	Pre-GLP		GLP	
	N	%	N	%
Fatal*	50	0.6	32	0.6
Injury	3,870	48.4	2,684	48.2
Material Damage > $1000	4,080	51.0	2,854	51.2
Total Crashes	8,000	100.0	5,570	100.0

* The number of fatal incidents reported here differs slightly from that reported in TAS. The fatal incidents reported in the BIWC should be taken as an indicator rather than an exact count of fatal crashes. TAS has been adopted by ICBC as the standard for fatal crash counts.

5.4.2 Compliance with GLP Learner Stage Restrictions

During the GLP Learner stage new drivers are not licensed to drive between midnight and 5 a.m., they are required to have a Full Privilege licensed adult supervisor in the car with them at all times (and no more than one other passenger), and they must maintain a zero Blood Alcohol Concentration (BAC). Police reported crashes (from TAS) involving Learner stage drivers were used to investigate the extent to which the crash profiles, with respect to these restrictions, have changed since the implementation of GLP.

This is not, however, a true assessment of compliance. It examines only the compliance of GLP Learners who were involved in police-reported crashes. The majority of GLP Learner drivers were not involved in any crashes. No information is available that would permit an examination of the extent to which these drivers complied with the Learner stage requirements. However, self-reported compliance assessed through a series of new driver surveys, has suggested that GLP driver compliance is high (Novice Driver Survey, 1999; Novice Driver Survey, 2000). Breach of licence restrictions (most of which are for breaches of GLP restrictions) will be examined in a later section of this report as another indicator of compliance.

A total number of 699 crashes involving a Learner driver were reported in TAS during the study period. None of these crashes involved more than one Learner driver. However, 13 drivers were involved in two crashes while in the Learner stage.

5.4.3 Time of Crash

If GLP drivers were complying perfectly with the restriction on driving between midnight and 5 a.m., we would expect to see no crashes involving a Learner driver during this time-period. Table 18 shows the breakdown of crashes by the time of day when the crashes occurred. Clearly, there was some non-compliance with this Learner stage restriction. In fact, of the crashes involving Learner drivers, a slightly higher percentage of the GLP crashes occurred during the restricted hours than the Pre-GLP crashes. Some of this difference may be offset by the higher percentage of Pre-GLP crashes for which the time was not available in TAS. However, this does not detract from the fact that even with GLP we are seeing more than 10% of crashes involving Learner drivers occurring during restricted hours.

Table 18: Distribution of Police Reported Crashes involving a Learner Driver by Time of Crash

Time of Crash	Pre-GLP		GLP	
	N	%	N	%
Midnight – 5 AM	29	8.6	40	11.0
5:01 AM – 4:00 PM	150	44.6	144	39.7
4:01 PM – 11:59 PM	138	41.1	176	48.5
Time Not Available	19	5.7	3	0.9
Total Crashes	336	100.0	363	100.0

5.4.4 Alcohol Involvement and Passenger Profile for Learner Driver Crashes

As with the time of day restriction, if GLP Learner drivers were complying perfectly with the Zero BAC and passenger restrictions, there would have been no alcohol-involved collisions and no collisions involving a restricted passenger profile. Table 19 shows the results of the assessment of police reported crashes. Contrary to expectations, there was a higher proportion of alcohol-involved crashes among GLP Learners than among Pre-GLP Learners ($P<0.015$). Why there has been an increase in the proportion of alcohol-involved crashes among GLP Learners is unknown. However, rather than indicating an increase in the incidence of drinking and driving, it may simply indicate increased ascertainment by police officers due to the zero tolerance for alcohol associated with GLP.

Table 19: Distribution of Learner Driver Crashes by Alcohol Involvement and Passenger Profile

		Pre-GLP		GLP	
		N	%	N	%
Alcohol Involved	Yes	15	4.5	34	9.4
	No/Don't Know	321	95.5	329	90.6
	Total	336	100.0	363	100.0
Passenger Profile	Accords with Learner Requirement	134	39.9	155	42.7
	Does not Accord with Learner Requirement	202	60.1	208	57.3
	Total	336	100.0	363	100.0

With respect to the presence of passengers in the vehicle at the time of the crash, a majority of both the GLP (57%) and Pre-GLP (60%) crashes involved passenger profiles that did not match the required GLP passenger profile (Table 19). Although the proportion of these crashes was lower for GLP Learners, the difference between

the groups was not statistically significant (P>0.45). A more detailed examination of the characteristics of the GLP and Pre-GLP Learner crashes revealed that almost a third of the crashes from both groups (30% and 32%, respectively), involved no passengers at all. In addition, a higher percentage of GLP crashes (17%) than Pre-GLP crashes (11%) involved at least 1 passenger under 19 years of age with no adult passengers in the vehicle.

5.4.5 Summary of Crash Characteristics

The characteristics of the new driver crashes observed for the GLP and Pre-GLP groups are quite similar. No meaningful differences were observed in the severity of their crashes, nor in the proportion of liable crashes. In addition, no significant differences were found between the groups with respect to the median cost of all crashes involving new drivers. However, it was observed that the injury and PDO crashes involving GLP drivers had higher median costs, per crash, than those involving Pre-GLP drivers. These results suggest that there may not have been the reduction in the severity and cost of GLP crashes that was sought when the program was implemented. Some caution must be taken in interpreting these results, however, because of the broad definitions used to categorize crash severities and their associated costs. Further work needs to be done to refine these indicators.

The analysis of crash characteristics also suggests that there is some lack of compliance with GLP Learner stage restrictions, at least by those GLP Learners who became involved in crashes. Even if not fully compliant, it was expected that GLP Learners would be involved in fewer of these types of crashes. However, this was not the case. The percentage of alcohol-related crashes was higher for GLP drivers and the proportion of late-night crashes and crashes involving prohibited passenger profiles did not differ significantly between the two study groups. Moreover, although the percentage of crashes involving no passengers, or an adult plus multiple passengers, was lower for the GLP cohort, the percentage of crashes in which the passengers were all under 19 was higher.

The higher percentage of alcohol-involved crashes among GLP Learners may be attributable to greater ascertainment on the part of the police officers reporting the crash; with a zero BAC limit on GLP Learners any suspicion of alcohol involvement is likely to be reported. This explanation does not apply, however, to the finding of no reductions in the proportions of night time crash involvements or crashes involving passenger profiles that do not accord with GLP requirements. It would seem, therefore, that at least some of the drivers in GLP who become involved in a crash have been engaging in GLP restricted behaviours. Furthermore, it suggests that GLP has not been successful in reducing the relative frequency of these types of crashes.

5.5 Characteristics of New Driver Violations and Prohibitions

5.5.1 Violations

A total number of 87,635 motor vehicle related violations[4] were reported during the study period: 39,862 for GLP drivers, and 47,773 for Pre-GLP drivers. The majority of these violations (over 76%) were committed by males. Whether this reflects an actual difference in the driving behaviours of new male drivers, relative to new female drivers, or a bias in police enforcement is unknown. However, in an exploratory study conducted to investigate young drivers' perceptions of the effectiveness of police roadblocks (Market Explorers, 1998) males thought they were effective; females did not. As stated in that study, "Females could usually count on driving through a road check unquestioned, impaired or not. Their impressions were that road check police were unlikely to stop them

[4] This includes only violations that resulted in a conviction.

because they did not suspect females of impaired driving." This perception may carry over to other areas of enforcement. Moreover, males may tend to drive more than females and this could result in greater exposure to police enforcement. In the 1999 ICBC Novice Driver survey, males reported driving approximately 12 hours per week in the novice driver stage compared to females who reported driving 10 hours per week.

Table 20 shows the distribution of new driver violations by violation type. Only violations for which the driver was convicted are included.

Table 20: Distribution of New Driver Violations

Violation Type	Pre-GLP		GLP	
	N	%	N	%
General Speeding	24,640	51.6	14,217	35.7
Dangerous Driving – alcohol, criminal code and excessive speeding convictions	2,643	5.6	1,548	3.9
Without Due Care and Attention	826	1.7	681	1.7
Other Moving Violations	7,449	15.6	4,268	10.7
Non-Moving Violations	8,456	17.7	5,742	14.4
12- and 24- Hour Prohibitions	3,359	7.0	2,660	6.7
Breach of Licence Restrictions	400	0.8	10,746	27.0
Total Violations	47,773	100.0	39,862	100.0

Speeding accounted for the highest percentage of all new driver violations issued to both GLP and Pre-GLP drivers. However, the percentage of all violations that was due to speeding was lower for GLP than Pre-GLP drivers. Conversely, the percentage of violations due to breaches of licence restrictions was much higher for GLP than for Pre-GLP drivers. These results were not surprising or unexpected. GLP introduced a number of licence restrictions that were not in place for drivers in the Pre-GLP group (Zero BAC, L- and N-signs, night driving and passenger restrictions for Learners). Consequently, more breaches were anticipated. Unfortunately, it is not possible to separate breaches of GLP restrictions from breaches of other licence restrictions (e.g., corrective lens restrictions, etc.). However, a comparison of the GLP and Pre-GLP group counts strongly suggests that the 10,746 Breaches observed for the GLP group are largely attributable to the new GLP restrictions.

Table 21 shows the distribution of new driver violations by violation type – with Breaches excluded. The percentage of general speeding violations is now more closely aligned between the GLP and Pre-GLP groups, with some of the difference accounted for by the fact that GLP drivers received a higher percentage of 12- or 24-hour prohibitions. Prior to GLP, there were no 12-hour prohibitions, and the Zero BAC restriction was not in place. Consequently, the higher percentage of violations in this category for GLP drivers is most likely attributable to the enforcement of these new components.

It is of note that impaired driving violations (other than 12- or 24-hour prohibitions) have not been isolated as a separate category in the above typology. This is because the number of alcohol-related violations was very low (less than 1%) in both study groups.

Table 21: Distribution of New Driver Violations – Excluding Breaches of Licence Restrictions

Violation Type	Pre-GLP		GLP	
	N	%	N	%
General Speeding	24,640	52.0	14,217	48.8
Dangerous Driving – alcohol, criminal code and excessive speeding convictions	2,643	5.6	1,548	5.3
Without Due Care and Attention	826	1.7	681	2.3
Other Moving Violations	7,449	15.7	4,268	14.7
Non-Moving Violations	8,456	17.9	5,742	19.7
12- and 24- Hour Prohibitions	3,359	7.1	2,660	9.1
Total Violations	47,373	100.0	29,116	100.0

The following tables provide the distribution of the number and types of violations committed by new drivers during their Learner and Novice stages. As might be expected, given the requirement that a Full Privilege licensed adult supervisor accompany Learner drivers, the number of violations is much lower during the Learner than the Novice stage. Violations during the Learner stage do still occur however, and this is a concern.

As shown in Table 22, almost 50% of the violations committed by GLP drivers, during the Learner stage, were breach of licence restrictions. Less than 20% of the violations of Pre-GLP drivers were this type. Once again, this is most likely due to the larger number of restrictions that accompany the GLP Learner licence. When breaches are excluded (Table 23), the distribution of the violations within the two groups is much more similar. Nonetheless, there are differences. In particular, and in correspondence with the addition of the 12-hour prohibition for GLP drivers and the zero BAC requirements, a higher percentage of GLP than Pre-GLP drivers were given short-term administrative prohibitions.

Table 22: Distribution of Learner Driver Violations

Violation Type	Pre-GLP		GLP	
	N	%	N	%
General Speeding	281	17.4	306	10.3
Dangerous Driving – alcohol, criminal code and excessive speeding convictions	58	3.6	101	3.4
Without Due Care and Attention	14	0.9	42	1.4
Other Moving Violations	175	10.8	225	7.6
Non-Moving Violations	670	41.5	703	23.6
12- and 24- Hour Prohibitions	112	6.9	219	7.4
Breach of Licence Restrictions	306	18.9	1,380	46.4
Total Violations	1,616	100.0	2,976	100.0

It is interesting to note the types of violations that were the most common (after exclusion of breaches) in both groups of Learner drivers. Speeding violations were quite common, but the highest percentage of Learner drivers committed offences categorized as "non-moving" violations. An examination of the specific violations included in this category revealed that most (88%) were related to driving a motor vehicle inappropriate to their licence class, or without a valid licence or proof of insurance. A further 10% of these Learner violations were related to seat belt infractions.

Table 23: Distribution of Learner Driver Violations –Excluding Breach of Licence Restrictions

Violation Type	Pre-GLP		GLP	
	N	%	N	%
General Speeding	281	21.5	306	19.2
Dangerous Driving – alcohol, criminal code and excessive speeding convictions	58	4.4	101	6.3
Without Due Care and Attention	14	1.1	42	2.6
Other Moving Violations	175	13.4	225	14.1
Non-Moving Violations	670	51.2	703	44.1
12- and 24- Hour Prohibitions	112	8.6	219	13.7
Total Violations	1,310	100.0	1,596	100.0

Novice driver violations, including breaches of licence restrictions, are shown in Table 24. As expected, GLP Novice drivers had a higher frequency of breaches than Pre-GLP Novice drivers did. However, in contrast to the pattern of violations observed for Learner drivers, the category of violations most common for Novice drivers was speeding. Once breaches of licence restrictions are excluded (Table 25), about 50% of all of the Novice driver violations, in both groups, were for speeding.

Table 24: Distribution of Novice Driver Violations

Violation Type	Pre-GLP		GLP	
	N	%	N	%
General Speeding	24,359	52.8	13,911	37.7
Dangerous Driving – alcohol, criminal code and excessive speeding convictions*	2,585	5.6	1,447	3.9
Without Due Care and Attention	812	1.8	639	1.7
Other Moving Violations	7,274	15.8	4,043	11.0
Non-Moving Violations	7,786	16.9	5,039	13.7
12- and 24- Hour Prohibitions	3,247	7.0	2,441	6.6
Breach of Licence Restrictions	94	0.2	9366	25.4
Total Violations	46,157	100.0	36886	100.0

Non-moving violations were also fairly common for Novice drivers. However, in contrast to Learner drivers, a higher percentage of these violations were for seat belt infractions (40% vs. 10%) and a lower percentage (55% vs. 88%) were for licence infractions (e.g. driving a motor vehicle inappropriate to the class of licence held, or being unable to produce a valid licence or proof of insurance).

Table 25: Distribution of Novice Driver Violations – Excluding Breach of Licence Restrictions

Violation Type	Pre-GLP		GLP	
	N	%	N	%
General Speeding	24,359	52.9	13,911	50.6
Dangerous Driving – alcohol, criminal code and excessive speeding convictions	2,585	5.6	1,447	5.3
Without Due Care and Attention	812	1.8	639	2.3
Other Moving Violations	7,274	15.8	4,043	14.7
Non-Moving Violations	7,786	16.9	5,039	18.3
12- and 24- Hour Prohibitions	3,247	7.1	2,441	8.9
Total Violations	46,063	100.0	27,520	100.0

5.5.2 Prohibitions and Suspensions

In British Columbia, penalty points are assigned to drivers who breach certain sections of the *Motor Vehicle Act* (or *Motor Vehicle Act Regulations*). In general, a higher pointed violation reflects a more serious violation. When GLP was introduced, the penalty point threshold for new driver prohibitions was reduced in an attempt to motivate new drivers to drive more safely. Although both pointed and no-point violations can be considered in a review of a driver's record, pointed violations are weighed more heavily in the decision to prohibit. Table 26 shows the total number of pointed offences committed by GLP and Pre-GLP drivers, and Table 27 shows the same breakdown but with breaches of licence restrictions excluded. Table 28 shows the number of new driver prohibitions and suspensions.

Table 26: New Driver Violations by Number of Penalty Points

Number of Penalty Points	Pre-GLP		GLP	
	N	%	N	%
2-Point Violations	4,376	9.2	2,361	5.9
3-Point Violations	31,613	65.2	28,759	72.2
6-Point Violations	826	1.7	681	1.7
10-Point Violations	397	0.8	231	0.6
No-Point Violations	10,561	22.1	7,830	19.6
Total Violations	47,773	100.0	39,862	100.0

Clearly, the most frequent category of violations for both groups of new drivers is 3-point violations. GLP drivers have a particularly high percentage of violations in this category, relative to the Pre-GLP drivers. However, breaches of licence restriction violations are included in the 3-point category and, as indicated earlier, the larger number of restrictions for GLP drivers accounts for much of this difference. Once these breaches are removed, the percentages become more similar. (Table 27).

Table 27: New Driver Violations by Number of Penalty Points – Excluding Breach of Licence Restrictions

Number of Penalty Points	Pre-GLP		GLP	
	N	%	N	%
2-Point Violations	4,376	9.2	2,361	8.1
3-Point Violations	31,213	65.9	18,013	61.9
6-Point Violations	826	1.7	681	2.3
10-Point Violations	397	0.8	231	0.8
No-Point Violations	10,561	22.3	7,830	26.9
Total Violations	47,373	100.0	29,116	100.0

Table 28 shows the number of driving prohibitions and licence suspensions incurred by the drivers in the GLP and Pre-GLP groups. Of particular interest is the much larger number of prohibitions issued to GLP drivers for poor driving records, despite the smaller number of drivers in this cohort (45,422 versus 67,086).

Table 28: New Driver Prohibitions and Suspensions by Type

Type of Prohibition or Suspension	Pre-GLP		GLP	
	N	%	N	%
OSMV* - Driving Record	1,833	83.4	6,717	96.6
Court Ordered- Driving Record	40	1.8	37	0.5
Court Ordered -Criminal Code	59	2.7	26	0.4
Court Ordered – Automatic 12 Month	81	3.7	62	0.9
Administrative Driving Prohibition	129	5.9	74	1.1
OSMV* - Indefinite Licence Suspension	41	1.9	30	0.4
Fitness to Drive	3	0.1	1	0.0
Young Offender Act or Term of Probation	11	0.5	4	0.1
Total Prohibitions and Suspension	2,197	100.0	6,951	100.0

** Office of the Superintendent of Motor Vehicles*

Table 29 shows the number of driving prohibitions and licence suspensions issued per driver for driving-related behaviours in each cohort. Often, drivers with more than 1 prohibition or suspension received them as a result of the same incident and served the terms concurrently. A total of 5,571 (12.3%) of the GLP drivers and 1,742

(2.6%) of Pre-GLP drivers received at least 1 driving behaviour-related prohibition during the study period. This clearly reflects the application of the sanction provided in GLP for prohibiting drivers at a lower penalty point threshold.

Table 29: Driving Behaviour-Related* Prohibitions and Suspensions Per Driver

Number of Prohibitions or Suspensions Per Driver	Pre-GLP		GLP	
	N	%	N	%
0	65,344	97.4	39,851	87.7
1	1,442	2.2	4,436	9.8
2	212	0.3	980	2.2
3	45	0.1	109	0.2
4	33	0.1	18	0.0
5	10	0.0	17	0.0
6	0	0.0	11	0.0
Total Drivers	67,086	100.0	45,422	100.0

** Fitness to Drive, Young Offender Act, and Term of Probation prohibitions have been excluded*

Table 30 shows the number of new driver prohibitions and suspensions listed by when they occurred. Once again, only driving behaviour-related prohibitions have been included. As shown, the vast majority occurred during the Novice (unsupervised) stage of driving, for both groups. However, a somewhat higher number of prohibitions were issued to GLP Learner drivers than to Pre-GLP Learners. Once again, this is likely a simple reflection of the greater number of licence restrictions on GLP drivers during the Learner stage and hence, the greater pool of potential infractions. It could also be a reflection of the extended time GLP drivers spend in the Learner stage. With a longer Learner stage, there is greater opportunity to collect violation tickets and, subsequently, prohibitions. Finally, a number of the GLP Learner and Novice driving prohibitions may have come about as a result of the requirement that they always display their "L" or "N" sign. In October 2000, violations relating to this requirement were no longer included in driving record reviews. This change may lead to a lower frequency of driving behaviour-related prohibitions for drivers who entered GLP after this date.

Table 30: Driving Behaviour-Related* Prohibitions and Suspensions by Licence Stage

Licence Stage	Pre-GLP		GLP	
	N	%	N	%
Learner	27	1.2	368	5.3
Novice	2,156	98.8	6,578	94.7
Total	2,183	100.0	6,946	100.0

** Fitness to Drive, Young Offender Act, and Term of Probation prohibitions have been excluded*

5.5.3 Summary of Violation and Prohibition Characteristics

With the introduction of GLP, new drivers have been subjected to a number of new rules and restrictions that, if not followed, could result in a conviction for a motor vehicle offence. In addition, fewer such convictions are required before the new driver may be subject to a driving prohibition.

The characteristics of the violations committed by GLP and Pre-GLP drivers suggest that there has been a shift in the distributions observed for the two groups. As would be expected, a higher percentage of GLP drivers incurred breach of licence restriction violations than did Pre-GLP drivers. As well, the percentage of 12- and 24-hour prohibitions was higher for GLP drivers. Such increases are in accordance with the additional rules and restrictions that are part of GLP, and provide an indication that the rules are being enforced. When breaches of licence restrictions are excluded, the pattern of violations committed by the drivers in each group is much more similar. Interestingly, when the violations of Learner drivers are separated from those of Novice drivers, the most frequent category of violations changes. For Learner drivers, "non-moving" violations were the most frequent; for Novice drivers "speeding" violations occurred more often.

The observation that GLP Learner drivers had a much higher relative frequency of breaches of licence restrictions and 12- or 24- hour prohibitions provides further evidence of some non-compliance with GLP rules. However, it should be noted that of the 45,822 GLP Learner drivers, only 1,044 (2.3%%) received either a breach of licence restriction conviction or a 12/24-hour prohibition, and only 1,433 (3.1%) received a conviction for any motor vehicle related offence. While this suggests that non-compliance with GLP Learner rules may have been fairly limited, this can be taken as an indication only. Clearly, the results presented here only reflect the experiences of drivers who got caught violating the restrictions. It does not provide an estimate of the number of drivers who committed these kinds of offences, but didn't get caught.

With respect to prohibitions, the data suggest that there has also been enforcement of the lower penalty point threshold for GLP drivers. A much higher percentage of GLP drivers (12.3%) received driving-related prohibitions than Pre-GLP drivers (2.5%).

5.6 Analysis of New Driver Crash Rates

In this section, the results of the analyses undertaken to determine the impact of GLP on the incidence and severity of new driver crashes are presented.

5.6.1 All New Drivers

To determine if there was a change in the incidence of new driver crashes after the introduction of GLP, the crash involvement rates of drivers in the GLP cohort were compared to the crash involvement rates of the Pre-GLP cohort. Rates rather than counts were used in the analyses in order to control for the effects of changes in licensure rates and differences in driver-time-at-risk. For all of the rates, the numerators were computed by summing across the number of crashes in which each driver was involved, during the study period. The rate denominators were based on the number of licensed driver-years accumulated during the 3.4 year follow-up period for each group. This means that only the time during which a driver held a valid licence is counted. Excluded from the computation of driver-years are periods during which a driver was prohibited from driving (excluding 12- and 24- hour prohibitions), had their licence suspended, or had permitted their licence to expire (for more than 30 days). For comparative purposes, rates were also calculated with these unlicensed periods included. The differences in the outcomes of the analyses using both sets of rates were minor. Hence, only the rates using licensed driver-years are reported here.

Table 31 shows the results of the analyses of all new driver crashes and of the crashes for which the new driver was found liable. To be considered liable for a crash the driver had to have been found, by an insurance adjuster, to be at least 50% responsible for the incident.

Table 31: Percentage Change in New Driver Crash Involvement Rates (per 100 driver-years)

	TAS Crashes			Claims Crashes		
	GLP	**Pre-GLP**	**% Change**	**GLP**	**Pre-GLP**	**% Change**
All New Driver Crashes:						
Number	5,695	8,171		24,266	38,311	
Rate	**4.78**	**5.01**	**-4.6****	**20.38**	**23.51**	**-13.3%*****
95% Confidence Interval	±0.12	±0.11	±3.3	±0.26	±0.24	±1.4
Driver-years	119,076	162,982		119,076	162,982	
Total Drivers	45,418	67,075		45,418	67,075	
New Driver Liable[#] Crashes:						
Number	Not available from TAS			14,719	22,545	**-10.6%*****
Rate				**12.36**	**13.83**	±1.9
95% Confidence Interval				±0.20	±0.18	
Driver-years				119,076	162,982	
Total Drivers				45,418	67,075	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

**** Statistically significant, P<0.0001*

Table 32 presents the comparison of casualty (injury and fatal combined) and property damage only new driver crashes. Fatal and injury crashes are not presented separately due to the very small number of fatal crashes in these two cohorts (See Table 17). Poisson regression analyses were used to test the significance of the comparison between these rates for Pre-GLP and GLP drivers. Drivers for whom age or gender information was not available (n=15) have been excluded from these and all subsequent analyses.

As shown in Tables 31 and 32, whether using TAS or BIWC crash data, or looking at all new driver crashes, liable new driver crashes, or new driver crashes involving a casualty or property damage only, the pattern is similar. GLP drivers had lower crash involvement rates than did Pre-GLP drivers. With respect to the severity of crashes, a greater percentage reduction in rates was observed for casualty than for property damage only crashes. However, this difference was relatively minor. Thus, when looked at in conjunction with the distributions of crash types by severity and costs presented in section 5.3.1 (Tables 12 and 13), little evidence has been found to

suggest that the severity of crashes involving GLP new drivers has changed substantially from that of Pre-GLP drivers.

Table 32: Percentage Change in New Driver Crash Involvement Rates (per 100 driver-years) by Type of Crash

	TAS Crashes			Claims Crashes		
	GLP	Pre-GLP	% Change	GLP	Pre-GLP	% Change
New Driver Crashes with Property Damage Only:						
Number	2,912	4,157		18,458	28,808	
Rate	**2.45**	**2.55**	**-4.1%#**	**15.50**	**17.68**	**-12.3%*****
95% Confidence Interval	±0.09	±0.08	±4.6	±0.22	±0.20	±1.6
Driver-years	119,076	162,982		119,076	162,982	
Total Drivers	45,418	67,075		45,418	67,075	
New Driver Casualty Crashes:						
Number	2,783	4,014		5,808	9,503	
Rate	**2.34**	**2.46**	**-5.1%****	**4.88**	**5.83**	**-16.3%*****
95% Confidence Interval	±0.09	±0.08	±4.7	±0.22	±0.20	±2.7
Driver-years	119,076	162,982		119,076	162,982	
Total Drivers	45,418	67,075		45,418	67,075	

**** Statistically significant, P<0.0001*

Before concluding that the observed reduction in new driver crash involvement rates can be attributed to GLP other possible explanatory factors need to be taken into account. One of the difficulties associated with using the Pre-GLP cohort as the comparison group in the study is that it is an historical cohort. Consequently, many factors other than GLP could account for the observed differences in crash rates. For example, different enforcement practices, road safety programs, economic conditions or general driving conditions could have affected the crash rates of drivers in the two cohorts. In the following section, the crash rates of the GLP and Pre-GLP cohorts are compared to the crash rates of time-matched cohorts of experienced drivers. If the crash rates observed for the experienced driver cohorts change in the same direction and with a similar magnitude as was seen with the GLP and Pre-GLP drivers this suggests that factors other than GLP are likely responsible for the change. However, if no similar reduction in rates is observed between the experienced driver groups, GLP becomes a stronger candidate for explaining the change in new driver rates.

Other known risk factors for crash involvement need to be considered as well. For example, age and gender are well known factors influencing crash rates. Young male drivers are at a particularly high risk of crash involvement, compared to other drivers. With the introduction of GLP there was a shift in the age distribution towards younger drivers. As well, a higher percentage of male drivers obtained their Novice licence within the study period. To obtain a more accurate estimate of the influence of GLP on the crash rates of new drivers it is important, therefore, to take the effects of age and gender into account.

Finally, biases may have been introduced into the crash rate calculations due to administrative or other differences in licensing processes between the GLP and Pre-GLP cohorts. The extent of influence these potential sources of bias had on the crash rates of the new driver cohorts also needs to be estimated.

The following sections (5.6.1.1 through 5.6.1.3) describe the results of the analyses that were undertaken to investigate these issues. The pattern and direction of results obtained using TAS and BIWC data were very similar. Therefore, only the results of the BIWC analyses are presented.

5.6.1.1 Comparison to Experienced Drivers

Figure 2 shows the crash rates observed for the experienced driver groups and for the Pre-GLP and GLP groups. Due to difficulties associated with removing unlicensed driver-time from the denominators of the experienced driver groups, the rates calculated in this section, for all four groups, used total driver-time rather than active driver-time. The rates are shown by calendar month, for the entire 3.4 year study period. The first 12 months shown on the graph (August through July) represent the intake period for all four groups. The selection criteria used to identify the experienced driver groups are detailed in section 5.1.1.

The crash rates for both of the new driver cohorts increased throughout the study period, with the Pre-GLP new driver rates remaining higher than the GLP rates for most of this period. It should be noted however, that by the end of the third month after the end of the intake period, the magnitude of the rates observed for the two new driver groups have moved much closer together. This reflects the fact that, by this time, the majority of both groups of drivers had graduated to the Novice stage. It is also interesting to note that even at the end of the 3.4 year follow-up period the crash rates have not yet begun to fall to the levels observed for the experienced driver cohorts. Finally, there appears to be a cyclical (seasonal) trend in the rates of all four groups, with the highest rates occurring between October and January of each year. For the new driver groups, this trend does not really begin to appear until after the end of the intake period, when many of the drivers have moved into the Novice stage of driving. The low crash rates seen in August and September of the intake year, for the experienced groups, are likely due to random variation resulting from the small number of drivers who were entered into the study during those early months.

Figure 2: New Driver Crash Rates by Calendar Month

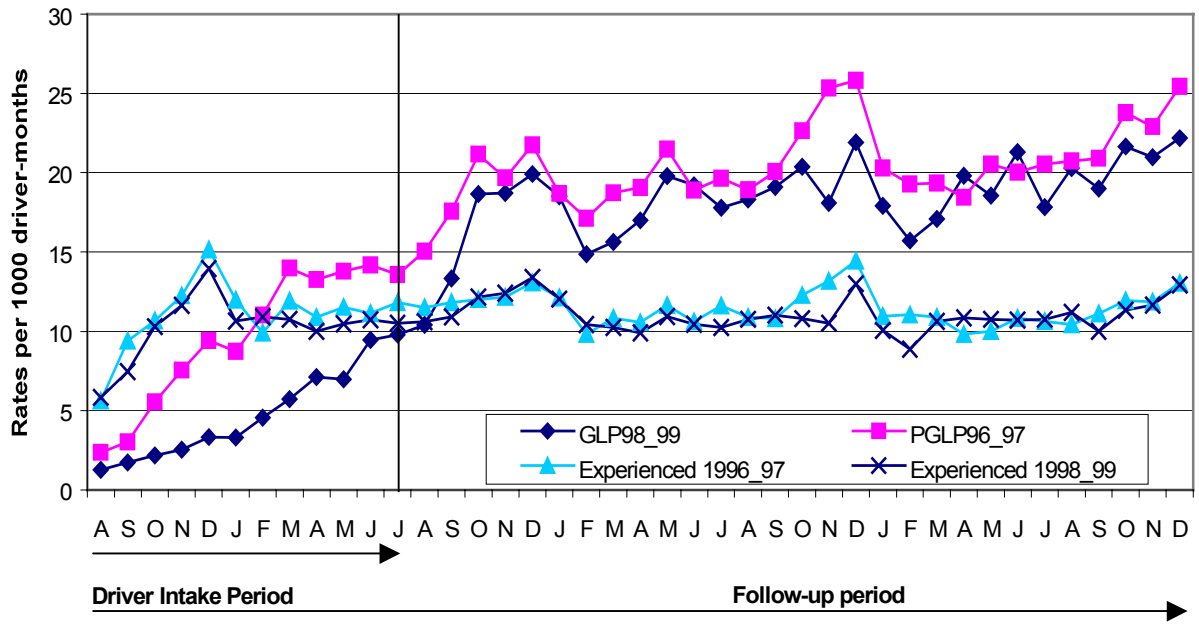


Table 33 shows the results of the comparison of the overall crash rates for new drivers (GLP and Pre-GLP) and experienced drivers (1998_99 and 1996_97). In both cases there was a reduction in the crash involvement rate of the later group of drivers compared to the earlier cohort. However, the reduction observed for the experienced driver groups was much less than that observed for the new driver groups. These findings suggest that general changes in the driving environment of British Columbia likely do not account for the differences in the crash rates observed between the GLP and Pre-GLP drivers, at least not entirely. Had the same reduction been obtained by new drivers as was obtained by the experienced driver group, the percentage reduction in the comparison of GLP to Pre-GLP driver rates would have been expected to stay at about 4-5%, not increase to 13–14%. The reduction in the experienced driver crash rates from the early period to the later period was only (13.88–13.27) 0.61 crashes per 100 driver-years. In contrast, for GLP drivers, there were (22.78–19.69) 3.09 fewer crashes per 100 driver-years, compared to Pre-GLP drivers. This indicates that something was influencing the rates of new drivers in a manner different to those of experienced drivers, and suggests that the primary factor was largely GLP.

Table 33: Crash Involvement Rates for New and Experienced Drivers

	New Drivers[#]			Experienced Drivers		
	GLP	Pre-GLP	% Change	1998_99	1996_97	% Change
All Driver Crashes:						
Number	24,266	38,311		83,796	75,798	
Rate	**19.69**	**22.78**	**-13.6%*** **	**13.26**	**13.87**	**-4.6%*** **
95% Confidence Interval	±0.25	±0.23	±1.4	±0.09	±0.10	±1.0
Driver -years	123,251	168,176		631,854	546,625	
Total Drivers	45,418	83,796		217,054	187,504	

[#] The rates presented here are not the same as those presented in Table 31 because here total follow-up years rather than actively licensed driver-years were used in the denominators.

****Statistically** significant, P<0.0001*

5.6.1.2 Comparison of New Driver Crash Involvement Rates Adjusted for Age, and Gender

Table 34 shows the age- and gender-specific New driver, Learner driver, and Novice driver-crash rates, for the GLP and Pre-GLP groups. For the New driver and Learner Driver rates, age was defined as the age at which the driver obtained his or her first Learner licence. For Novice driver rates, age was defined as the age at which the driver obtained his or her first Novice licence.

In general, female drivers have lower crash rates than do male drivers, and this is seen in both the GLP and Pre-GLP cohorts. As well, older new drivers tend to have lower crash rates than do younger new drivers, except for those in the Learner stage. In the Learner stage, older new drivers, particularly older males, have higher crash rates than do younger Learners. In general, GLP driver crash rates tend to be lower than Pre-GLP driver rates across most age and gender groups. However, for female Novice drivers the trend is reversed.

Because crash rates vary by both age and gender, simple differences in the age and/or gender distribution of two driver cohorts could produce very different overall crash rates. Consequently, when comparing two groups differences in age and gender composition may confound the relationship between the risk factor of interest (e.g. GLP) and the crash involvement rate. As was indicated previously, the introduction of GLP prompted a large number of new drivers to apply for their licence before the new regulations came into place. All of these drivers had to be 16 years of age or older at that time in order to be eligible for a licence. This resulted in a reduction in the proportion of older drivers in the GLP cohort when compared to the Pre-GLP cohort. Consequently, the two study cohorts are not similar in age distribution. It is possible, therefore, that the difference between the crash rates calculated in Tables 31 and 32 may not reflect as accurate an estimate as would be obtained if the rates were adjusted to take into account the age and gender effects. It is important, therefore, to try to examine the influence of these two potential confounders, and to try to estimate the effect of GLP on new driver-crash rates when the effects of age and/or gender shifts have been taken into account. Clearly, as population and other changes

continue to occur, age and/or gender shifts may happen again and it is important to identify what component of observed rate changes are due to program changes versus age and / or gender changes.

Table 34: Age- and Gender-specific New Driver Crash Involvement Rates (per 100 Driver-years) – from BIWC

	MALE			FEMALE		
ALL NEW DRIVER CRASHES	**GLP**	**Pre-GLP**	**% Change (± 95% CI)**	**GLP**	**Pre-GLP**	**% Change (± 95% CI)**
Age (in years):						
16	26.1	30.7	-15.1 ± 2.1	17.7	20.2	-12.6 ± 2.9
17 - 18	25.8	34.0	-24.2 ± 4.7	16.2	20.5	-21.2 ± 6.3
19 +	19.8	24.2	-18.2 ± 4.6	10.7	14.5	-26.0 ± 4.2
LEARNER DRIVER CRASHES	**GLP**	**Pre-GLP**	**% Change (± 95% CI)**	**GLP**	**Pre-GLP**	**% Change (± 95% CI)**
Age (in years):						
16	2.8	3.3	-15.5 ± 16.3	2.2	2.8	-21.8 ± 16.9
17 - 18	4.7	4.2	+11.8 ± 36.8	2.7	3.7	-28.8 ± 27.3
19 +	6.3	6.9	- -9.0 ± 17.4	3.3	4.9	-32.8 ± 11.6
NOVICE DRIVER CRASHES	**GLP**	**Pre-GLP**	**% Change (± 95% CI)**	**GLP**	**Pre-GLP**	**% Change (± 95% CI)**
Age (in years):						
16	33.7	34.7	-2.8 ± 2.7	24.3	23.6	+2.8 ± 3.8
17 - 18	33.9	37.7	-10.1 ± 4.1	24.0	23.7	+1.3 ± 5.9
19 +	31.4	28.2	+11.3 ± 6.2	18.5	17.3	+6.9 ± 6.1

It is expected, given the larger proportion of younger aged drivers in the GLP cohort, that the age adjustment of the crash rates will widen the gap between the two groups, at least for all new driver crashes, and Novice driver crashes. There is a tendency for younger Learner drivers to have lower crash rates than older Learner drivers. For these drivers, adjustment for age may well narrow the gap. Adjustment for gender is not expected to have much influence on the rates computed for Learner drivers, but may narrow the gap observed between the GLP and Pre-GLP crash rates for Novice drivers. Recall that the GLP group was observed to have a higher proportion of male drivers than the Pre-GLP group, and males tend to have a higher risk of crash involvement than do females. Consequently, adjustment for gender may produce a slightly lower GLP Novice crash rate and slightly higher Pre-GLP crash rate.

Poisson Regression Models were used to assess the effects of age and gender and to estimate the age- and gender-adjusted crash involvement rates for all new drivers in the Pre-GLP and GLP cohorts. The rates of all crash involvements, new driver-liable crashes, casualty crashes and property damage crashes were estimated and compared. The results of these models are shown in Table 35.

As expected, after adjusting for the effects of age and gender differences between the two cohorts, the impact of GLP on new driver crash rates was more pronounced – with, for example, a 17.3% reduction in overall crash

rates as opposed to the 13.3% reduction obtained before adjustment (Table 31). Age and gender-adjusted Learner and Novice driver crashes are presented in later sections (5.6.2 and 5.6.3) of the report, but generally accord with the expectations outlined above.

Table 35: Estimated Percentage Change in Age- and Gender- Adjusted New Driver Crash Involvement Rates (per 100 driver-years)

	Claims Crashes		
	GLP	Pre-GLP	% Change
All New Driver Crashes:			
Adjusted Rate	18.88	22.84	**-17.3%*** **
95% Confidence Interval	±0.25	±0.23	±1.4
New Driver Liable# Crashes:			
Adjusted Rate	11.12	13.25	**-16.1%*** **
95% Confidence Interval	±0.19	±0.18	±1.8
New Driver Crashes with Property Damage Only:			
Adjusted Rate	14.36	17.14	**-16.3*** **
95% Confidence Interval	±0.22	±0.20	±1.6
New Driver Casualty Crashes:			
Adjusted Rate	4.51	5.68	**-20.6%*** **
95% Confidence Interval	±0.12	±0.12	±2.7
Driver-years	119,076	162,982	
Total Drivers	45,418	67,075	

A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible

****Statistically significant, P<0.0001*

5.6.1.3 Tests for Bias

Two difficulties arose in using the Pre-GLP cohort as the comparison group in this evaluation. First, the licence issuing term for Pre-GLP Learners was only six months; for GLP drivers it was 12 months. This change is particularly problematic for Learners who entered the program, obtained one Learner licence, let it expire with no

subsequent renewal. These drivers may not have driven very much, while they held their Learner's licence, whether they were in the GLP or Pre-GLP group. However, due to the difference in the licence term, the denominator for the Pre-GLP drivers in this category would be half as long as for those in the GLP group. This would tend to inflate the overall crash rate for Pre-GLP drivers, making the difference between the two groups appear larger than it should. Second, almost 4% of the original Pre-GLP cohort entered the GLP program prior to the end of the study period. Once they entered GLP, their inclusion as a Pre-GLP driver was terminated. Most of these drivers entered the Novice stage of GLP, although some entered GLP as a Learner. It is expected, however, that most of the bias would be felt as a result of the exclusion of the Novice driver-time and therefore, that the Pre-GLP overall crash rate would be somewhat underestimated.

To investigate the presence and extent of the bias introduced by these two factors, three analyses were conducted. First, the driver-time of the Pre-GLP drivers who did not progress beyond their first Learner permit was altered to equate with that of GLP drivers in this category. The Poisson Regression Models were then rerun using this altered driver-time variable as the rate denominator. These results are shown in Table 36.

As anticipated, the effect of adjusting for the administrative change in the term of a Learner licence was a slight lowering of the adjusted rate for Pre-GLP drivers (compare rates in Table 36 to those in Table 35) and a consequent attenuation of the percentage reduction obtained for the GLP group. Where appropriate, the results of subsequent analyses presented in this report will include this adjustment to the denominator.

Second, in order to estimate the effect of excluding the post-GLP records of the Pre-GLP drivers who entered GLP during the study period, the original analyses were redone with these drivers omitted. As a result of these analyses it was determined that the amount of bias was less than 1%, in favour of GLP. For example, when the percentage change in age- and gender-adjusted rates was computed using all driver data, there was a 17.3% reduction in the overall crash rate of GLP drivers, relative to Pre-GLP drivers (Table 35). With the exclusion of the subset of Pre-GLP drivers who later entered GLP, the percentage reduction was 18.1%. Due to the relatively minor effect of the estimated bias, the results of these additional analyses have not been included in this report.

Third, to eliminate both of the former sources of bias, all of the analyses were redone including only the drivers who successfully completed their Learner stage and, therefore, graduated to their respective Novice stages during the study period. The results of these analyses are shown in Table 37.

Table 36: Estimated Percentage Change in Age- and Gender- Adjusted New Driver Crash Involvement Rates (per 100 driver-years) - after adjusting for the shorter term Learner licences for Pre-GLP drivers

	Claims Crashes		
	GLP	Pre-GLP	% Change
All New Driver Crashes:			
Adjusted Rate	18.81	22.41	**-16.1%*** **
95% Confidence Interval	±0.25	±0.23	±1.4
New Driver Liable# Crashes:			
Adjusted Rate	11.07	13.00	**-14.8%*** **
95% Confidence Interval	±0.19	±0.17	±1.8
New Driver Crashes with Property Damage Only:			
Adjusted Rate	14.30	16.82	**-15.0*** **
95% Confidence Interval	±0.21	±0.20	±1.6
New Driver Casualty Crashes:			
Adjusted Rate	4.50	5.58	**-19.3%*** **
95% Confidence Interval	±0.12	±0.11	±2.7
Driver-years	119,076	166,370	
Total Drivers	45,418	67,075	

A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible

****Statistically significant, P<0.0001*

Table 37: Estimated Percentage Change in Age- and Gender- Adjusted New Driver Crash Involvement Rates (per 100 driver-years) - for drivers who successfully completed the Learner stage during the study period

	Claims Crashes		
	GLP	**Pre-GLP**	**% Change**
All New Driver Crashes:			
Adjusted Rate	21.05	24.04	**-12.4%*** **
95% Confidence Interval	±0.27	±0.24	±1.5
New Driver Liable# Crashes:			
Adjusted Rate	12.35	13.99	**-11.7%*** **
95% Confidence Interval	±0.21	±0.19	±1.9
New Driver Crashes with Property Damage Only:			
Adjusted Rate	16.03	18.05	**-11.2*** **
95% Confidence Interval	±0.24	±0.21	±1.7
New Driver Casualty Crashes:			
Adjusted Rate	5.01	5.97	**-16.1%*** **
95% Confidence Interval	±0.13	±0.12	±2.9
Driver-years	107,074	156,131	
Total Drivers	38,631	56,733	

A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible

****Statistically significant, P<0.0001*

The results in Table 37 show the same pattern as in the previous tables. However, the gap between GLP and Pre-GLP rates is even narrower than in Table 36. This attenuation of effect may be due to the fact that the groups compared in these analyses included only the drivers who were most motivated to progress through the licensing process during the study period. This may have made the groups somewhat more comparable in terms of their driving exposure. Drivers in both groups will have had to spend enough time driving to acquire the skills they needed to pass their road test and advance to the Novice stage.

In the next two sections, the crash rates of GLP and Pre-GLP Learner and Novice drivers are compared.

5.6.2 Learner Drivers

One of the primary changes introduced with GLP was the extension of the minimum Learner stage from 30 days to 6 months (or to 3 months if the driver takes and ICBC approved driver-training course). Table 38 shows the age- and gender-adjusted crash rates estimated for GLP and Pre-GLP Learner drivers. As in the overall rates, age was defined as the age when the driver obtained his or her first Learner licence. Table 39 shows the rates after adjustment for the administrative change in the licensing term for Pre-GLP Learners' licences. Poisson Regression was used to assess the statistical significance of the percentage difference in the observed rates. Table 40 shows the rates obtained by Learner drivers who successfully completed the Learner stage, and advanced to the Novice stage, during the study period.

Table 38: Estimated Percentage Change in Learner Age- and Gender- Adjusted Learner Driver Crash Involvement Rates (per 100 driver-years)

	Claims Crashes		
	GLP	**Pre-GLP**	**% Change**
All Learner Driver Crashes:			
Adjusted Rate	3.05	3.81	**-19.9%*** **
95% Confidence Interval	±0.17	±0.23	±6.7
Learner Driver Liable[#] Crashes:			
Adjusted Rate	2.05	2.52	**-18.9*** **
95% Confidence Interval	±0.14	±0.19	±8.4
Learner Driver Crashes with Property Damage Only:			
Adjusted Rate	2.25	2.83	**-20.6*** **
95% Confidence Interval	±0.15	±0.20	±7.8
Learner Driver Casualty Crashes:			
Adjusted Rate	0.80	.98	**-18.0***
95% Confidence Interval	±0.09	±0.12	±14.0
Driver-years	39,491	27,874	
Total Drivers	45,418	67,075	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

** Statistically significant, P<0.05* ****Statistically significant, P<0.0001*

A comparison of the rates presented in Table 38 with those presented in Table 35 highlights a statement made earlier about the magnitude of Learner driver crash rates. In Table 35, the GLP and Pre-GLP crash rates, based on all new drivers and new driver crashes during the study period, were about 19 and 23 per 100 driver-years, respectively. When only Learner driver crashes are considered, the rates fall to about 3 and 4 per 100 driver-years, respectively. As will be seen in the next section, the difference in magnitude is even more pronounced when Learner driver crash rates are compared to the crash rates of Novice drivers only.

Table 39: Estimated Percentage Change in Learner Age- and Gender-Adjusted Learner Driver Crash Involvement Rates (per 100 driver-years) - after adjusting for the shorter term Learner licences of Pre-GLP drivers

	Claims Crashes		
	GLP	**Pre-GLP**	**% Change**
All Learner Driver Crashes:			
Adjusted Rate	3.07	3.39	**-9.5%***
95% Confidence Interval	±0.17	±0.20	±7.7
Learner Driver Liable# Crashes:			
Adjusted Rate	2.06	2.25	**-8.5%**
95% Confidence Interval	±0.14	±0.17	±9.6
Learner Driver Crashes with Property Damage Only:			
Adjusted Rate	2.26	2.52	**-10.3***
95% Confidence Interval	±0.15	±0.18	±8.9
Learner Driver Casualty Crashes:			
Adjusted Rate	0.81	0.87	**-7.3%**
95% Confidence Interval	±0.09	±0.10	±15.9
Driver-years	39,491	31,262	
Total Drivers	45,418	67,075	

A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible

** Statistically significant, P<0.05* *** Not significant, P>0.07*

Despite the low Learner driver crash rates in both the GLP and Pre-GLP cohorts, GLP Learner drivers still had significantly lower crash rates across all categories of crashes than Pre-GLP Learners. The effect was attenuated when the rates were adjusted for the shorter Learner licence issuing term of Pre-GLP drivers (Table 39). However, it remained significant for the comparison of all Learner driver crashes and crashes involving property damage only. Although the attenuation appears large, based on the revised percentage change, this is due to the very low rates involved. With such low rates even a small change in rate has a large effect on the percentage change.

Table 40: Estimated Percentage Change in Age- and Gender- Adjusted Learner Driver Crash Involvement Rates (per 100 driver-years) - for drivers who successfully completed the Learner stage during the study period

	Claims Crashes		
	GLP (n=38,635)	Pre-GLP (n=56,741)	% Change
All Learner Driver Crashes:			
Adjusted Rate	3.16	3.72	**-15.2%***
95% Confidence Interval	±0.21	±0.26	±8.6
Learner Driver Liable# Crashes:			
Adjusted Rate	1.96	2.38	**-17.7%***
95% Confidence Interval	±0.17	±0.21	±10.6
Learner Driver Crashes with Property Damage Only:			
Adjusted Rate	2.36	2.76	**-14.6***
95% Confidence Interval	±0.18	±0.19	±10.1
Learner Driver Casualty Crashes:			
Adjusted Rate	0.80	0.96	**-16.8%**
95% Confidence Interval	±0.11	±0.12	±17.4
Driver-years	27,488	21,023	
Total Drivers	38,631	56,733	

A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible

* *Statistically significant, P<0.05*

Table 40 presents the results of the analyses involving only those Learner drivers who graduated to the Novice stage during the study period. Once again, there is an attenuation of the effect presented in Table 38, but not to the same degree as seen in Table 39.

Although the magnitude of the percentage rate reduction for GLP Learner drivers varies depending upon the method of estimation used, it is clear that the crash rates for GLP Learner drivers are lower than the rates observed for Pre-GLP Learners. It is, however, not possible to isolate the extent of rate reduction attributable to specific components within the GLP Learner stage. Data relevant to the identification of alcohol-involvement, time of the crash, and passenger profile were not available expect for police-reported crashes and, as noted earlier, these do not reflect a total or representative census of these events. As well, it was not possible to obtain measures of exposure to risk based on the numbers of hours of driving practice, or on the amount of driving at night, after drinking alcohol, or with prohibited passengers in the vehicle would be required. These data would also be needed in order to fully understand the impact of the individual GLP components on the crash rates of Learner drivers. Thus, the observed rate reductions reflect only the estimated impact of the total complement of Learner stage components.

5.6.3 Novice Drivers

Table 41 shows the age- and gender-adjusted crash rates observed for GLP and Pre-GLP Novice drivers. To adjust for age differences between the cohorts, the age at which the driver obtained his or her first Novice licence was used. Poisson regression was again used to assess the statistical significance of the percentage difference in the observed rates. No adjustment for the sources of bias encountered in the Learner and all driver crash analyses were required here as all of the Novice drivers had to have completed the Learner stage successfully.

The analysis of Novice crash rates revealed a significant reduction in the casualty crash involvement rate of Novice drivers. However, no difference in rates was observed when all crashes were compared. Although GLP Novice drivers had slightly higher liable and property damage only crash rates, the differences were not statistically significant.

In general terms, these results suggest that, despite a slight reduction in casualty crash rates, the GLP Novice stage has contributed little to the overall reduction observed in the new driver crash involvement rate of GLP drivers. Instead, it is likely that the primary factor contributing to the observed reduction is the extended Learner stage associated with GLP. As noted in the previous section (5.6.2), Learner drivers in GLP had very low crash rates, even lower than Pre-GLP drivers, and by extending the Learner stage these very low rates would have been in effect for a greater proportion of the 3.4 year time period studied than the comparable low Learner rates of the Pre-GLP group In the following section, the extent of the impact of this factor will be explored further.

Table 41: Estimated Percentage Change in Novice Age- and Gender- Adjusted Novice Driver Crash Involvement Rates (per 100 driver-years)

	Claims Crashes		
	GLP	**Pre-GLP**	**% Change**
All Novice Driver Crashes:			
Adjusted Rate	27.13	27.13	**0.0%**
95% Confidence Interval	±0.36	±0.28	±1.7
Novice Driver Liable[#] Crashes:			
Adjusted Rate	15.90	15.75	**+1.0%**
95% Confidence Interval	±0.28	±0.21	±2.2
Novice Driver Crashes with Property Damage Only:			
Adjusted Rate	20.67	20.37	**+1.5**
95% Confidence Interval	±0.32	±0.24	±2.0
Novice Driver Casualty Crashes:			
Adjusted Rate	6.44	6.74	**-4.5%***
95% Confidence Interval	±0.18	±0.14	±3.3
Driver-years	79,588	135,111	
Total Drivers	38,632	56,735	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

* *Statistically significant, P<0.05*

5.6.4 Effect of the Extended Learner Stage on New Driver Crash Rates

To determine the extent to which the longer Learner stage might account for the observed reductions in the overall new driver crash involvement rates, several analyses were conducted. Firstly, GLP and Pre-GLP crash involvement rates for all new drivers were compared and, secondly, GLP and Pre-GLP Novice driver crash rates were compared. In each case the rates were compared after adjustment for age, gender, and the number of months spent as an actively licensed Learner driver. The results of these analyses are shown in Tables 42a and 42b.

Table 42a: Comparison (% Change) of Crash Involvement Rates (± 95% Confidence Interval) after Adjustment for Age, Gender and Number of Months as a Learner-Driver – All crashes and Liable Crashes

All Crashes	TAS	BIWC
All New Drivers	GLP 11.6% (±4.4%) higher than Pre-GLP group***	GLP 13.2% (±2.2%) higher than Pre-GLP group***
All New Drivers – Pre-GLP drivers who only obtained 1 Learner licence with no subsequent renewal or progress were assumed to have licence issue term of 1 full year (same as GLP drivers).	GLP 14.1% (±4.5%) higher than Pre-GLP group***	GLP 16.2% (±2.2%) higher than Pre-GLP group***
All New Drivers – who successfully completed their Learner stage	GLP 5.8% (±2.0%) higher than Pre-GLP group	GLP 7.5% (±2.1%) higher than Pre-GLP group***
Novice Drivers only	GLP 11.6%* (±4.4%) higher than Pre-GLP group***	GLP 6.6% (±2.1%) higher than Pre-GLP group***
Liable Crashes Only	**BIWC**	
All New Drivers	GLP 9.9% (±2.6%) higher than Pre-GLP group***	
All New Drivers – Pre-GLP drivers who only obtained 1 Learner licence with no subsequent renewal or progress were assumed to have licence issue term of 1 full year (same as GLP drivers).	GLP 12.8% (±2.7%) higher than Pre-GLP group***	
All New Drivers – who successfully completed their Learner stage	GLP 4.2% (±2.6%) higher than Pre-GLP group***	
Novice Drivers only	GLP 3.3% (±2.7%) higher than Pre-GLP group	

*** S*tatistically significant, P<0.0001)*

After adjusting for age, gender, and the number of months spent as a Learner-driver, the estimated relative risks shown in Tables 42a and b indicated higher crash involvement rates for GLP than Pre-GLP new drivers. Similar results were obtained when the analyses were restricted to drivers in the Novice stage. In all cases, except for casualty crashes, the estimated relative risk ratios (GLP to Pre-GLP) were statistically significantly greater than 1.

Table 42b: Comparison (% Change) of Crash Involvement Rates (± 95% Confidence Interval) after Adjustment for Age, Gender and Number of Months as a Learner-Driver – Casualty and Property Damage only Crashes

Property Damage Only Crashes	BIWC
All New Drivers	GLP 15.8% (±2.5%) higher than Pre-GLP group***
All New Drivers – Pre-GLP drivers who only obtained 1 Learner licence with no subsequent renewal or progress were assumed to have licence issue term of 1 full year (same as GLP drivers).	GLP 18.8% (±2.5%) higher than Pre-GLP group***
All New Drivers – who successfully completed their Learner stage	GLP 10.0% (±2.4%) higher than Pre-GLP group***
Novice Drivers only	GLP 9.2% (±2.5%) higher than Pre-GLP group***
Casualty Crashes only	**BIWC**
All New Drivers	GLP 5.8% (±4.0%) higher than Pre-GLP group***
All New Drivers – Pre-GLP drivers who only obtained 1 Learner licence with no subsequent renewal or progress were assumed to have licence issue term of 1 full year (same as GLP drivers).	GLP 8.8% (±4.1%) higher than Pre-GLP group***
All New Drivers – who successfully completed their Learner stage	GLP 0.2% (±4.2%) higher than Pre-GLP group
Novice Drivers only	GLP 1.1% (±4.1%) lower than Pre-GLP group

*** S*tatistically significant, P<0.0001)*

Further research will be required in order to fully understand why the estimated overall and Novice GLP crash rates would be higher than the Pre-GLP rates, after adjustment for the length of the Learner stage. However, the higher rates may simply be an artefact of the analysis. When using driver-years as a denominator in the calculation of rates it is assumed that the crash risk remains constant throughout the follow-up period. This is probably not a valid assumption in the analysis of new driver crash rates. Clearly, Learner driver rates are much lower than the rates for Novice drivers. This is true for both GLP and Pre-GLP drivers. It has also been shown, in other jurisdictions, that the crash risk of drivers during the first few months of unsupervised driving (Novice stage) are higher than the crash risks of drivers during later months (Mayhew et al., 2000; Mayhew et al., 2002). Since both the GLP and Pre-GLP cohorts were followed in this study for a maximum of 3.4 years, and the GLP drivers had a longer Learner stage than the Pre-GLP drivers, more higher risk Novice driver-time is included in the calculation of the overall and Novice crash rates for GLP drivers (more GLP Novice drivers were still in the earlier months of the Novice stage at the end of the study than were the Pre-GLP drivers). Consequently, when the effect of the longer Learner stage is taken into account, a higher rate estimate would be obtained for GLP than Pre-GLP drivers.

To investigate this issue further, several analyses were undertaken to compare crash rates during the first two years of licensure – from the date when the first Learner licence was obtained and from the date when the first Novice licence was obtained.

5.6.4.1 First Two Years of Licensure

To explore the effects of the extended Learner stage on the incidence of GLP crashes, monthly rates were calculated for new drivers during their first two years of licensure (i.e., from the date they obtained their first Learner licence). These rates are shown in Figure 3. Only the first two years have been plotted because the number of drivers with more than two years of licensure starts to decline substantially each month, after this point. As a result, the monthly rates start to become somewhat unstable.

Figure 3: Age- and Gender-Adjusted New Driver Crash Involvement Rates by Number of Months Since Obtaining a First Learner Licence

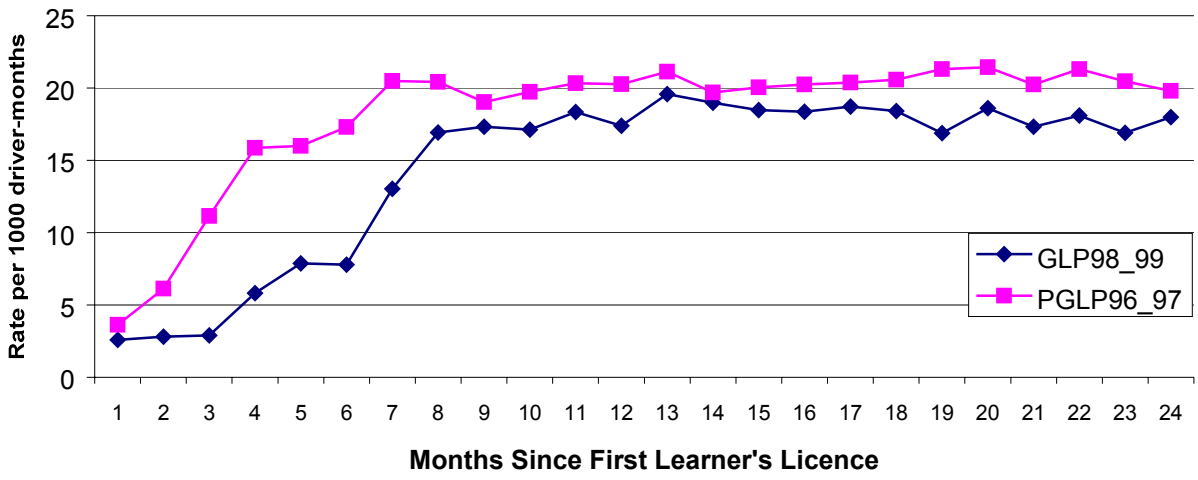
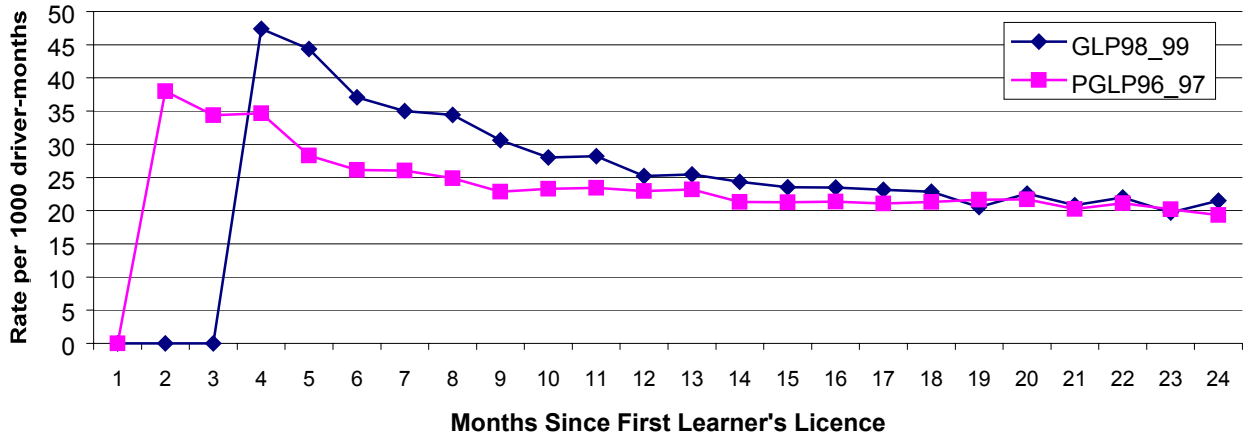


Figure 3 demonstrates the different pattern of crash rates observed for GLP and Pre-GLP drivers, and helps to clarify why the crash rates of GLP drivers are lower than were those of Pre-GLP drivers. As was indicated earlier, the median length of the Learner stage for Pre-GLP drivers was about 4.5 months, while for GLP drivers it was closer to 8 months. This means that 50% of the Pre-GLP cohort had graduated to unsupervised driving by 4.5 months. Meanwhile, it took up to 8 months for 50% of the GLP cohort to graduate to this stage. During the first 3 months, GLP drivers are all in the Learner stage. Between months 3 and 6, GLP drivers who had completed an approved driver-training course started to graduate. Those who did not take an approved course started to graduate after 6 months. The impact of these differences in progress through the licensing process is the area between the two curves. Clearly, during the early months shown, the Pre-GLP group has much higher crash rates, attributable, largely, to the fact that a larger proportion of GLP than Pre- GLP drivers were still in the low crash-rate Learner stage. Although the rates for the Pre-GLP group remain higher for the entire two-year period, the gap narrows considerably once the majority of GLP drivers start leaving the Learner stage (months 8 and 9).

Figure 4 clearly shows that a jump in crash rates occurs, for both the GLP and Pre-GLP groups, as soon as drivers start to leave the supervised Learner stage and begin driving on their own. Recall that the average Learner crash involvement rate for both study groups is approximately 3-4 crashes per 100 Learner years. It is also apparent in Figure 4 that the first graduates into the Novice stage, or unsupervised stage of driving, have particularly high crash rates. Moreover, the first GLP drivers who graduated into the Novice stage have higher monthly crash rates than did the first Pre-GLP drivers who graduated.

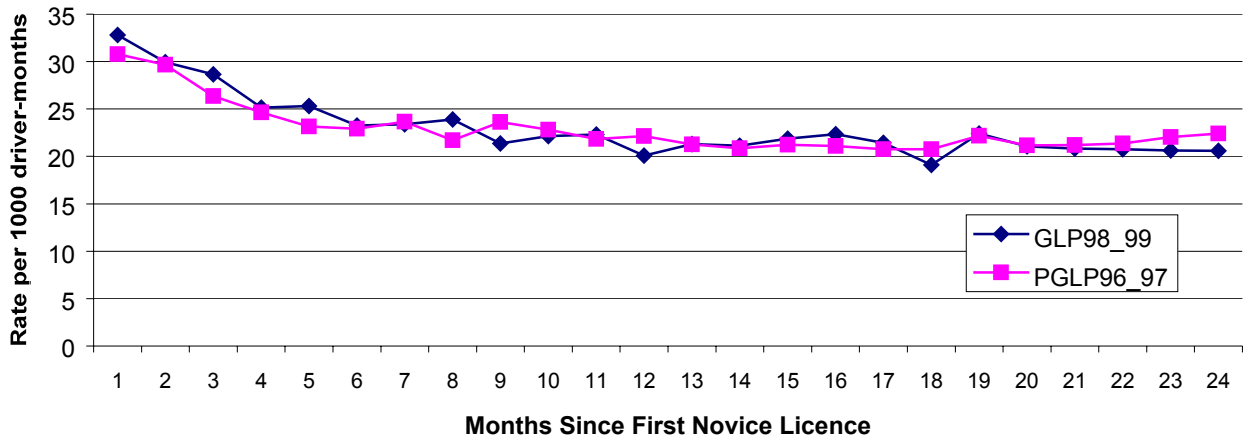
Figure 4: Age and Gender Adjusted Novice Driver Crash Involvement Rates by Month



These drivers were motivated to graduate as soon as possible. For the GLP drivers, this was the group that completed an approved driver-training course so they could obtain a time credit to reduce the length of their Learner stage. Why the monthly rates are higher for this group of drivers is not clear at this point, but will be explored further in a subsequent chapter of this report. One factor contributing to the high rate, for GLP and Pre-GLP drivers who entered the Novice stage during the first month of their eligibility, is the relatively low number of drivers in this group. As noted before, if the number of drivers is small the impact of a crash on the crash rate is greater than when the number of drivers is large. It should also be noted that drivers from both groups who graduated as soon as they were eligible (excluding those in GLP who obtained a time credit) have crash rates that are quite similar (compare months 2-4 for the Pre-GLP group with months 6-8 for the GLP group).

Figure 5 shows the monthly crash rates for the two study groups after the drivers have obtained their first Novice licence and began to drive unsupervised. As is shown, there is a gradual decline in the monthly crash rates for both groups. The rates are particularly high for the first 6 months of unsupervised driving but level off by month nine.

Figure 5: Age and Gender- Adjusted Novice Driver Crash Involvement Rates by Month



To further explore the impact of the extended GLP Learner stage, and the effect of changing driver risks over time, two additional sets of analyses were conducted. First, crash rates were compared between the study groups for all drivers who had held a licence (Learners and/or Novice) for at least one year. A similar comparison was also done for drivers who had held a licence for at least two years. Secondly, the crash rates of drivers who had held a Novice licence for at least one year, and for at least two years, were compared. In each case, the analyses were conducted both with and without adjustment for the length of the Learner stage. Adjustment for age and gender was used in all of the models. The results are provided in Table 43.

Table 43: Comparison (% Change) of New Driver Crash Rates During the First Two Years of Driving After Adjustment for Age, Gender and Before and After Adjustment for Learner Stage Variables

	% Change in Crash Rate
First Year of Driving– unadjusted for the length of the Learner stage	GLP 33.6% (± 2.1%) Lower than Pre-GLP group***
First Year of Driving–adjusted for the length of the Learner stage	GLP 42.5% (± 5.5%) Higher than Pre-GLP group***
First 2 Years of Driving–unadjusted for the length of the Learner stage	GLP 20.1% (± 1.6%) Lower than Pre-GLP group***
First 2 Years of Driving –adjusted for the length of the Learner stage	GLP 22.2% (± 2.9%) Higher than Pre-GLP group***
First Year as a Novice Driver- unadjusted for length of the Learner stage	GLP 1.3% (± 2.9%) Higher than Pre-GLP group
First Year as a Novice Driver - adjusted for the length of the Learner stage	GLP 14.0% (± 3.3%) Higher than Pre-GLP group***
First 2 Years as a Novice Driver– unadjusted for the length of the Learner stage	GLP 0.8% (± 2.1%) Lower than Pre-GLP group
First 2 Years as a Novice Driver - adjusted for the length of the Learner stage	GLP 10.9% (± 2.8%) Higher than Pre-GLP group***

****Statistically significant, P<0.0001*

As would be expected, based on the graphical analysis, lower overall age- and gender-adjusted crash rates were obtained for GLP drivers than for Pre-GLP drivers during their first and second years of driving. After adjustment for the length of the Learner stage, however, higher crash rates were obtained for the GLP group, during both periods of time, than for the Pre-GLP group. However, the actual percentage increase was quite a bit higher during the first year of driving than over the first two years of driving. These findings suggest two things. Firstly, they confirm the conclusion drawn earlier that the observed reductions in the crash rates of GLP drivers are largely attributable to the extended Learner stage. Secondly, they suggest that increases obtained after adjustment for the length of the Learner stage most likely do reflect a change in the crash risks associated with the drivers in each group. During the first year of licensure, the GLP group is composed largely of Learner drivers and some drivers in the earliest months of their Novice stage. The Pre-GLP group is composed of fewer Learner drivers and a higher proportion of Novice drivers with more solo driving experience. During the earliest months of solo driving, new drivers are at their highest risk of crash involvement. As they gain experience, their risk reduces. Consequently, after adjusting for the beneficial effects of the longer learner stage, the GLP group appears to have a higher estimated crash rate because of the higher crash risks associated with the Novice drivers in their group. As more time passes, and more of the GLP drivers enter and progress through the Novice stage, their crash risks start to become more similar to those of the Pre-GLP comparison group, and the difference between the two groups begins to diminish. This tendency towards an equalisation of crash rates is starting to be seen in the computed percentage difference obtained for the first two years of driving.

The results shown in Table 43 also included an exploration of the effect of the GLP extended Learner stage on Novice driver crash rates. The results of these analyses confirm the earlier suggestion that GLP has had little impact on the crash rates of drivers once they enter the Novice stage. No differences are observed between the crash rates of the GLP and Pre-GLP groups before adjustment for the length of the Learner stage and, after adjustment, the estimated rates for GLP Novices are somewhat higher than those estimated for the Pre-GLP group. This suggests that not only are the restrictions or sanctions imposed on Novice drivers not having much effect, but neither is the longer period of time spent in the supervised Learner stage. Had the longer Learner stage affected the Novice driver crash rates in a positive way, we would have expected to see lower rates for GLP Novice drivers before adjustment, and rates that did not exceed those of the Pre-GLP drivers, after adjustment. Clearly, more effort needs to be directed towards finding ways to reduce the crash rates of Novice drivers.

5.6.5 Summary of New Driver Crash Rate Analysis

The results presented in this section suggest that GLP has been effective in reducing the crash rates of new drivers. Over the full 3.4 year study period, a reduction of 13.3% was observed in the overall crash rate when no adjustments were made for potentially confounding factors (e.g., age, gender, and driver-time biases). Once these factors were taken into account the reduction was estimated to be about 16-17%. The reduction in the overall crash rate for drivers who graduated to the Novice stage during the study period was estimated to be about 12%. Although a portion of the observed reductions may be attributable to factors other than GLP, the estimated amount of influence from changes in general driving and other conditions over the time period studied suggested that the influence of these factors was small. GLP appears to be the most likely explanation for the observed reductions.

With respect to the specific factors that may be contributing to the observed reductions, the results suggest that it is primarily the extension of the GLP Learner stage that is driving the change. The lack of differences observed between the monthly crash rates of Novice drivers in the GLP and Pre-GLP groups, and the increased rates associated with GLP drivers, after adjustment for the longer Learner stage, both contribute to this conclusion. Through the reduced exposure to risk inherent in the supervised Learner stage, GLP drivers are being held to a lower crash rate longer than were their Pre-GLP counterparts. And it is this factor that appears to have the

greatest impact on the overall rates. Reductions were obtained in the crash rates of GLP Learner drivers, compared to Pre-GLP Learner drivers. However, the impact of these reductions on overall crash rates is small, due to the fact that Learner crash rates are already very low.

No evidence has been obtained thus far to suggest that GLP has successfully reduced the crash rates of drivers once they obtain their Novice licence. This may be due to the lack of meaningful restrictions on these drivers. More work is required to find ways to reduce crash risks during this highly vulnerable phase of the driver licensing process. Research conducted elsewhere suggests that night-time or passenger restrictions may be appropriate (Williams and Mayhew, 2003; Chen, et al., 2000; Williams, 2000). More stringent penalties for unsafe driving may also be required. In BC's GLP, new drivers who receive driving prohibitions have their time in the Learner or Novice stage increased by the length of the prohibition. In some jurisdictions (for example, Nova Scotia), new drivers have to start their Learner or Novice phase over again if they receive a licence suspension or driving prohibition.

5.7 Analysis of New Driver Violation and Driving Prohibition Rates

This section investigates the relationship between the introduction of GLP and the driving behaviours of new drivers. GLP was designed primarily to reduce the crash rates of new drivers. In order to achieve this goal, the Learner stage was extended, new restrictions were added to the driver's licence, and the threshold for prohibition sanctions was lowered. It was assumed that these changes would help to promote safer driving behaviours on the part of new drivers. In particular, they would be motivated to drive more carefully to avoid the increased likelihood of a prohibition from driving. Clearly, with the larger pool of potential violations that could prompt a prohibition (i.e., the new licence restrictions and 12-hour licence suspensions) , and the lower penalty point threshold, GLP drivers are more likely than Pre-GLP drivers to experience this sanction – if they do not modify their behaviour.

Unfortunately, due to limitations in the available data, it was not possible to obtain a full census of driving behaviours for this study. Instead, only those driving behaviours resulting in the issuance of a violation ticket, and for which a guilty determination was made, are included in the analyses. As an indicator of driving behaviour, violation convictions are vulnerable to biases from many sources, particularly changes in police enforcement and driving exposure. Without an assessment of these two factors, it is not possible to attribute any differences detected between the study groups solely to GLP. At best, the results may indicate that an association exists. An effort was made however, to include a comparative analysis of the violation rates of new and experienced drivers. This was done in the analysis of crash rates, and is repeated with violation rates for similar reasons. The inclusion of two time-matched experienced driver cohorts provides an indication of what the trend in violations was during the time periods covered by the two new driver cohorts – exclusive of GLP. This will provide an indication as to what extent any changes in rates observed between GLP and Pre-GLP new drivers are possibly attributable to GLP and what changes may be due to changes in police enforcement and other factors that have influenced the violation rates of all drivers. Further research will be required in order to determine to what extent any differences in violation rates may be attributable to differences in driving exposure.

5.7.1 All New Drivers

The analysis of driving behaviour presented here is based on the calculation of violation and short-term (12 or 24 hour) prohibition rates. Driving behaviour-related prohibition rates will also be examined, but for a different purpose. A reduction in prohibition rates for the cohort of GLP drivers included in this evaluation is not expected – even if there is a reduction in some categories of violations. A lower penalty point threshold was introduced with GLP, and the opportunity to receive more points was established with the addition of several new

licence restrictions. Moreover, as was noted in the Year 2 Interim Evaluation, communication of the lower threshold was minimal in the first couple of years of GLP and consequently, there was a general lack of awareness of this particular program component. Without awareness, it is unlikely that the lower threshold would have had much deterrence value. More effort has been made in the last few years to ensure this information is available to new drivers entering GLP. If awareness has increased as a direct result of this information, as well as through the word-of-mouth experience of new drivers themselves, and if the lower threshold does serve as a deterrent, then a reduction in prohibition rates may be obtained. A future evaluation, using a cohort of GLP drivers who have completed the fully implemented GLP and who have had the time to become aware of the lower penalty point threshold component of the program, will enable us to investigate this question further. The analysis of prohibition rates presented here will be primarily descriptive and will simply provide a baseline for future reference. Prohibitions or suspensions arising due to fitness to drive issues, violations of the Young Offender's Act, or as a term or Probation have all been excluded. Due to the small number of prohibitions, no sub-categories of driving-related prohibitions/suspensions were analyzed.

Given the increase in the number of restrictions on the licences of GLP drivers, it is not particularly informative to compare these types of violations to those of Pre-GLP drivers. Consequently, for the purposes of comparing violations indicative of safer driving behaviours, only those violations common to both groups will be evaluated. The following categories were used in these analyses: 1) pointed speeding violations; 2) all other pointed violations, and 3) Short-term (12/24 hour) prohibitions. Speeding violations were highlighted because speeding is the most common moving violation and because it is frequently used as a surrogate or indicator for driving exposure. Short-term (12/24-hour) prohibitions were included in order to determine if the addition of the zero BAC requirement of GLP had prompted an increase in rate for this category. Although an increase in rate could indicate an increase in drinking and driving among new drivers, there is no particular reason to suspect that drinking and driving has increased in this group. More likely, any observed increase simply reflects the increased use of short-term prohibitions by police officers charged with the responsibility of enforcing the zero BAC restrictions.

Table 44 shows the results of the initial analysis of violation and prohibition rates for GLP and Pre-GLP new drivers. As with the analysis of crash rates, Poisson regression was used to test the significance of the comparison between the rates of the two groups. Drivers for whom age and/or gender (N=15) was not available were excluded from the analyses. For completeness, the category of "breach of licence restrictions" has been included in this table. They will not be included in subsequent comparisons of the Pre-GLP and GLP drivers.

The results shown in Table 44 reveal that the rates of speeding and other pointed violations (with breaches excluded) are significantly ($P<0.0001$) lower for GLP new drivers than for Pre-GLP new drivers. In contrast, 12- and 24-hour prohibition rates are significantly higher for GLP drivers ($P<0.02$) than Pre-GLP drivers. Driving behaviour-related prohibitions and suspensions are higher for GLP new drivers ($P<0.0001$) as well.

The lower violation rates observed for GLP drivers could suggest that they are driving more safely than are Pre-GLP drivers. Alternatively, they may simply reflect changes in police enforcement or other factors external to GLP. For the same reasons as were given for the lower overall crash rates of GLP drivers, the lower violation rates may also result from the extended GLP Learner stage. This assumes, of course, that the violation rates of Learner drivers are lower than the violation rates of Novice drivers. This will be investigated in a later section of this report.

The higher 12/24 hour prohibition rate observed for GLP drivers was anticipated due to the addition of a zero BAC restriction on GLP licences. However, if this sanction is effective, and as the consequences of violating the zero BAC restriction become more well known, this rate might be expected to drop somewhat over time.

The higher prohibition/suspension rate observed for GLP drivers was also anticipated, given the lower penalty point threshold applied to these drivers – relative to Pre-GLP drivers. It will be interesting to see if the incidence rate of this sanction, like that of the 12/24 –hour prohibition, declines in subsequent GLP cohorts as the sanction becomes more widely known.

Table 44: Percentage Change in New Driver-Violation and Prohibition Rates (per 100 driver-years)

	Violations / Prohibitions		
	GLP	**Pre-GLP**	**% Change**
Pointed Speeding Violations:			
Number	15,317	26,572	
Rate	**12.86**	**16.30**	**-21.1%*** **
95% Confidence Interval	±0.20	±0.20	±1.6
Other Pointed-Violations – excluding breach of licence restrictions:			
Number	5,968	10,234	
Rate	**5.01**	**6.28**	**-20.2%*** **
95% Confidence Interval	±0.13	±0.12	±2.6
Breach of Licence Restrictions:			
Number	10,746	400	
Rate	**9.02**	**0.24**	**+3,577.1%*** **
95% Confidence Interval	±0.17	±0.02	±392.3
12/24 Hour Prohibitions:			
Number	2,660	3,356	
Rate	**2.23**	**2.06**	**+8.5%***
95% Confidence Interval	±0.08	±0.07	±5.7
Driving-Behaviour Related Prohibitions/Suspension:			
Number	6,946	2,183	
Rate	**5.83**	**1.3**	**+335.5%*** **
95% Confidence Interval	±0.14	±0.06	±21.6
Driver-years	119,076	162,982	
Total Drivers	45,418	67,075	

**Statistically significant, P<0.05* ***Statistically significant, P<0.0001*

In the following section, analyses are undertaken to investigate whether the changes observed in the violation and short-term prohibition rates are specific to the new driver groups (i.e., are GLP-related) or whether they are observed in other, experienced driver groups as well (i.e., are non-GLP-related).

5.7.1.1 Comparison to Experienced Driver Rates

The analyses described in this section compare the violation rates of GLP and Pre-GLP drivers to those of time-matched experienced drivers. In all of these analyses, breaches of licence restrictions are excluded. The intent here is to ascertain if GLP is associated with a change in violation rates, either overall or with respect to certain types of violations. The inclusion of breach of licence violations would confound this analysis because of the additional restrictions that accompanied the implementation of GLP. For similar reasons, some caution will be required in the interpretation of any changes in the rates of short-term (12- or 24- hour) alcohol-related prohibitions. Licence suspensions and prohibitions were not included because of the lower penalty point threshold applied to GLP drivers.

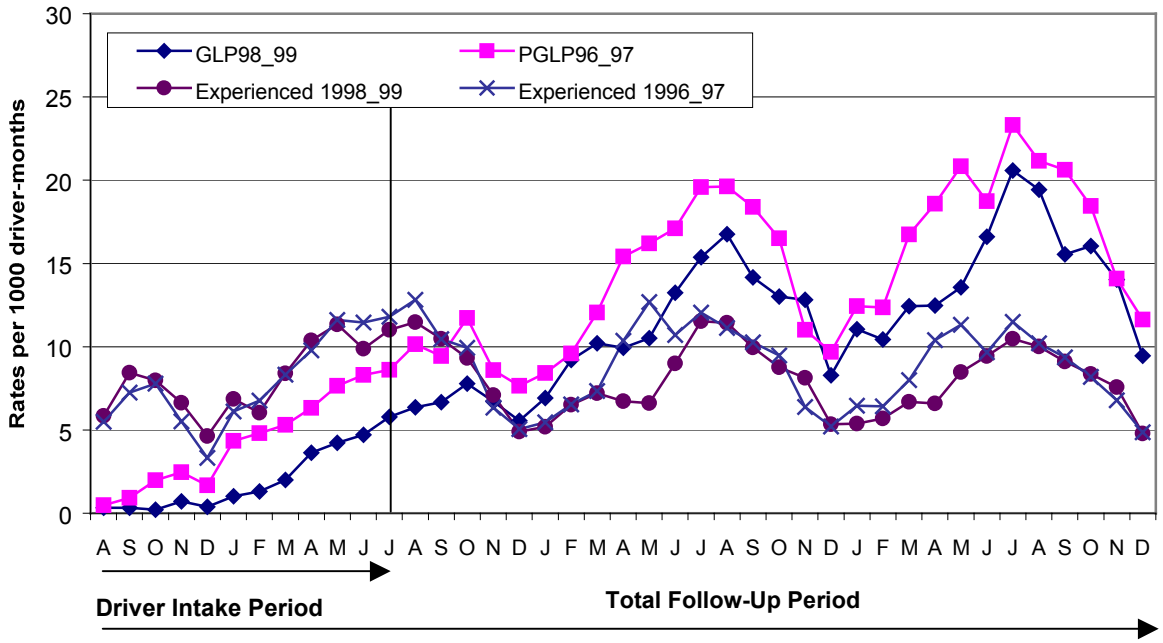
As mentioned earlier, one of the difficulties encountered when comparing rates from two new driver groups that are separated in time is that factors other than GLP may confound the results. For violation rates, changes that have occurred in enforcement practices may lead to changes in rates that have little to do with the changes in the licensing process. Some of these changes can be handled by excluding categories of violations that did not exist for the previous cohort (as mentioned above) but some cannot. One example of one that cannot is Photo Radar. Photo radar was initiated in British Columbia on August 2, 1996 and cancelled on June 27, 2001. Thus, for the latter 6 months of the GLP follow-up period, Photo Radar was no longer operational. This change could have affected the enforcement of speeding violations for GLP drivers in a way not experienced by Pre-GLP drivers. Consequently, with the removal of the photo radar program, the speeding violation rates observed for GLP drivers could start to change simply because of this change in enforcement practice – rather than as a result of being a GLP participant.

To explore the extent to which such changes in enforcement, or in other social, economic, or road safety initiatives, may have influenced the violation rates of GLP and Pre-GLP drivers, monthly crash rates were computed for the two new driver study groups and two time-matched experienced driver groups. As described in Section 5.6.1.1, the experienced driver groups were selected so that their crash and violation records could be compiled for the same period as those of the new driver groups. Changes in the violation rates obtained for the experienced driver groups may provide an indication of the extent to which observed changes may reflect the impact of GLP or other social, environmental or enforcement factors.

The monthly violation rates for each category (pointed speeding violations, other pointed violations, and 12/24 hour prohibitions) are shown in Figures 6 through 8. For all of the comparisons made in this section, the denominators for all four groups were based on total driver-time, not actively licensed driver-time.

Several interesting patterns are seen in Figure 6. First, there is a clear and strong seasonal trend in speeding violation rates – for all 4 groups. Rates are lowest during the months of November through March and highest during May through October. The higher rates that were observed during the spring and summer months are likely due to a combination of increased driving exposure and increased police enforcement. Although the patterns for all four groups are similar, it is interesting to note that the cyclical increase begins earlier for both 1996-97 groups than for the 1998-99 groups. This may be indicative of a higher degree of enforcement during March and April in 1998 and 1999 than in 2000 and 2001.

Figure 6: Monthly Violation Rates – Speeding only



The second interesting pattern is that, in contrast to the experienced driver groups whose rates fluctuate steadily around a mean of about 12-13 violations per 1000 driver-months, the new driver violation rates increase over time. During the first 12 months or so, the new driver rates are lower than those observed for the experienced drivers, but after that, they begin to increase beyond the levels seen for the experienced groups. This increasing trend is not surprising. It simply reflects the progress of new drivers through the licensing system, with rates increasing as more drivers leave the supervised Learner stage. However, it is interesting that they increase to more than double the rates of experienced drivers. Even with 3.4 years of follow-up, there is still a gap between the new driver and experienced driver rates.

Finally, the violation rates of GLP drivers appear to be consistently lower than the rates obtained for Pre-GLP drivers. This does not appear to be the case for experienced drivers. For these groups, there is very little difference in the rates of the experienced driver groups. Moreover, any impact the cancellation of the Photo Radar program might have had on the speeding violation rates of the groups of drivers included in this study appears to have been relatively small. This suggests that while there may have been changes in police enforcement or other social, economic, or road safety initiatives, they do not appear to explain the observed differences in the rates of the two new driver groups. It is more likely that factors, such as changes in the distribution of age and gender, or the changes in the licensing program, may be playing a role. It is also possible that the differences will be explained by the extended Learner stage established for GLP drivers. The higher rates observed during the first 12 months of licensure for the Pre-GLP group seem to suggest that at least part of the explanation derives from the fact that GLP drivers remain in the Learner stage longer

Although lower in magnitude, an examination of all pointed violations, other than speeding (Figure 7), reveals a very similar pattern. Interestingly, there is no apparent effect of the cancellation of photo radar during the last 6 months of the GLP cohort's follow-up period. During this time the GLP driver rates remained lower than, and continued to follow the same pattern as, those of the Pre-GLP drivers. As well, no obvious change in the pattern of the violation rates of the experienced drivers is observed.

Figure 7: Monthly Violation Rates – All Pointed Violations Except Speeding and Breach of Licence Restrictions

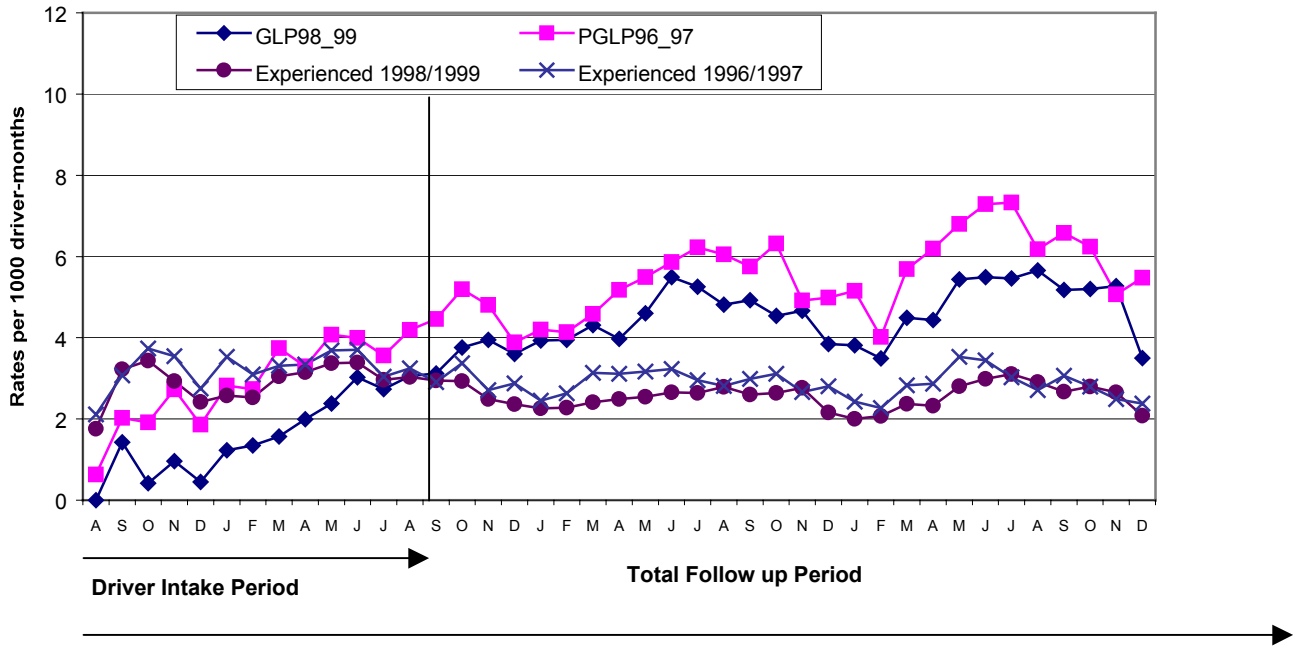
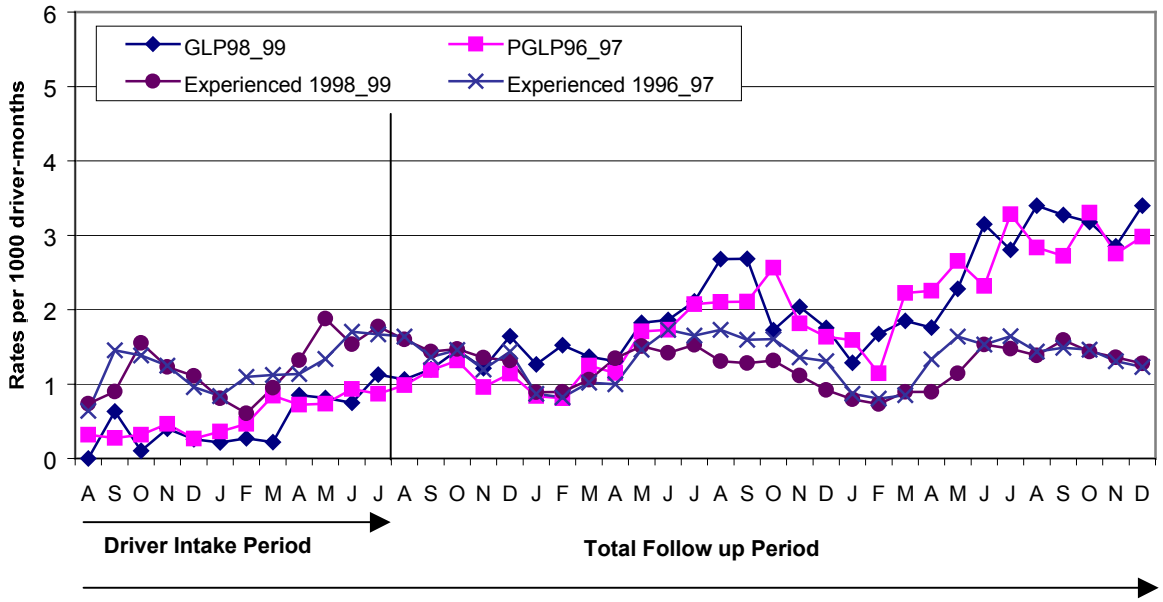


Figure 8 shows the monthly rates of 12- and 24-hour prohibitions. A zero blood alcohol content (BAC) is a requirement for GLP. The 12-hour prohibitions were introduced with the implementation of the program; 24-hour prohibitions were already in place. It was noted in the Year 2 Evaluation Report that police officers had indicated that they were as likely to issue a 24-hour as a 12-hour prohibition to new drivers. Consequently, and because none of the Pre-GLP drivers could be given a 12-hour prohibition, all of the 12- and 24-hour prohibitions have been included in this category of administrative sanctions. As the graph shows, the trend for these short-term prohibitions is slightly different than the trend observed for speeding, or for all pointed violations (excluding Breaches) combined. First, the magnitude of the rates is much lower. The experienced drivers have rates that fluctuate at about 1.2 – 1.3 prohibitions per 1,000 driver-months. And no major differences are apparent between the 1996_97 and 1998_99 groups. Once again, the new driver rates (both GLP and Pre-GLP) reflect the effect of graduation from the Learner to Novice stage, and show an increasing trend over time. However, in contrast to the previous graphs, here the rates of the GLP and Pre-GLP new drivers are very similar. Moreover, the rates do not begin to exceed those of the experienced driver groups until about 2 years into the follow-up periods. This may coincide with an increase in the age of the new drivers – with more of them approaching legal drinking age.

Figure 8: 12- and 24-Hour Prohibitions



The graphs presented in this section were provided primarily to look at the patterns and trends in violation rates for new drivers and experienced drivers. The purpose was to identify any hints that enforcement or other social or road safety factors may have influenced the observed new driver rates in a way that would confound the comparison of GLP and Pre-GLP rates. As mentioned earlier, there may be an issue concerning enforcement. The rates depicted above show an earlier seasonal increase in violation rates for the drivers that were followed from 1996 through 1998, than for those followed from 1998 through 2001. To explore this issue further, and to assess the potential magnitude of this effect the overall violation rates (in each category) for the new drivers and experienced drivers were calculated.

Table 45 shows the results of these analyses and indicates that there have been larger changes in the new driver violation rates than in the experienced driver rates. There was also an increase in the rates of 12/24-hour prohibitions administered to GLP drivers, relative to Pre-GLP drivers, while a decrease was observed for the experienced drivers followed during the same time periods. These results, though not conclusive, do suggest that while enforcement (or other social factors) may have had an effect on violation rates, such factors do not provide a full explanation. Other factors, and specifically the extended GLP Learner stage, are more likely candidates for explaining the observed differences in the violation rates observed between GLP and Pre-GLP new drivers.

As noted in the analysis of crash rates, however, the rate estimates produced for the new driver groups may be biased by the shift in the age and gender distribution that occurred as a result of the implementation of GLP. The extent of this bias is investigated in the following section.

Table 45: Violation and 12/24- Hour Prohibition Rates[+] for New and Experienced Drivers (per 100 driver-years)

	New Drivers			Experienced Drivers		
	GLP	Pre-GLP	% Change	1998_99	1996_97	% Change
Pointed Speeding-Violations:						
Number	15,317	26,572		62,781	58,839	
Rate	12.43	15.80	**-21.3%*** **	9.94	10.76	**-7.7%*** **
95% Confidence Interval	± 0.20	± 0.19	± 1.6	± 0.08	± 0.09	± 1.0
Other Pointed Violations – excluding breach of licence restrictions						
Number	5,968	10,234		20,404	19,812	
Rate	4.84	6.09	**-20.4%*** **	3.23	3.62	**-10.9%*** **
95% Confidence Interval	± 0.12	± 0.12	± 2.6	± 0.04	± 0.05	± 1.8
12/24-Hour Prohibitions Only:						
Number	2,660	3,356		9,703	8,850	
Rate	2.16	2.00	**+8.2%***	1.54	1.62	**-5.2%** **
95% Confidence Interval	± 0.08	± 0.07	± 5.6	± 0.03	± 0.03	± 2.8
Driver-years	123,251	168,176		631,854	546,626	
Total Drivers	45,418	67,075		217,054	187,504	

+ The new driver rates presented in this table differ from those in Table 45 because total follow-up years rather than actively licensed driver-years were used in the denominators of this table. Actively licensed years were not available for the experienced drivers.

* *Statistically significant, P<0.05* ** *Statistically significant, P<0.001* *** *Statistically significant, P<0.0001*

5.7.1.2 New Driver Rates Adjusted for Age and Gender

As noted previously, younger drivers tend to have higher crash rates than older drivers, and young drivers (particularly young male drivers) tend to have higher violation rates as well. For these reasons it is important to take into account the role of age and gender in the estimation of the difference between GLP and Pre-GLP violation rates. Due to the very small number of Breach of Licence Restriction violations committed by Pre-GLP drivers, and the different rules that applied to the two new driver groups with regard to this class of violations, they are not included here. Driving prohibition and/or suspension rates have been included primarily to obtain more precise estimates. There is no doubt that more of these sanctions have been applied since the implementation of GLP. It is the estimated extent of the increase that can be explored further by examining the effect of variables such as age and gender.

As was indicated in the analysis of crash rates, there are a number of different ways in which to calculate the denominators in the study of new driver rates. The basic rate uses the total number of actively licensed years as the denominator. These are reported in Table 46. However, it will be recalled that Pre-GLP drivers who had only one Learner licence and no subsequent renewal had a shorter licence term than GLP drivers in the same situation. Consequently, Table 47 shows the recalculated rates after taking into account this administrative change.

Table 46: Percentage Change in New Driver-Violation and Prohibition Rates (per 100 driver-years) – Adjusted for Age at First Learner Licence and Gender

	Violations / Prohibitions		
	GLP	**Pre-GLP**	**% Change**
Pointed Speeding Violations:			
Adjusted Rate	**8.78**	**12.86**	**-31.6%*****
95% Confidence Interval	±0.17	±0.17	±1.4
Other Pointed-Violations – excluding breach of licence restrictions:			
Adjusted Rate	**3.80**	**5.11**	**-25.7%*****
95% Confidence Interval	±0.11	±0.11	±2.4
12/24 Hour Prohibitions:			
Adjusted Rate	**1.39**	**1.34**	**+4.0%**
95% Confidence Interval	±0.07	±0.06	±5.5
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**3.63**	**0.94**	**+286.6%*****
95% Confidence Interval	±0.11	±0.05	±19.4
Driver-years	119,076	162,982	
Total Drivers	45,418	67,075	

****Statistically significant, P<0.0001*

Table 47: Percentage Change in New Driver-Violation and Prohibition Rates (per 100 driver-years) – Adjusted for Age at First Learner Licence, Gender, and for the shorter Learner Term for Pre-GLP Learners

	Violations / Prohibitions		
	GLP	**Pre-GLP**	**% Change**
Pointed Speeding Violations:			
-Adjusted Rate	**8.74**	**12.63**	**-30.8%*** **
95% Confidence Interval	±0.17	±0.17	±1.4
Other Pointed-Violations – excluding breach of licence restrictions:			
Adjusted Rate	**3.78**	**5.01**	**-24.6%*** **
95% Confidence Interval	±0.11	±0.11	±2.5
12/24 Hour Prohibitions:			
Adjusted Rate	**1.39**	**1.31**	**+5.6%***
95% Confidence Interval	±0.07	±0.06	±5.6
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**3.62**	**0.92**	**+292.2%*** **
95% Confidence Interval	±0.11	±0.05	±19.7
Driver-years	119,076	166,370	
Total Drivers	45,418	67,075	

* *Statistically significant, P<0.05* *** *Statistically significant, P<0.0001*

Finally, Table 48 shows the rates calculated for the subset of drivers who successfully completed the Learner stage and graduated into the Novice stage during the study period.

Table 48: Percentage Change in New Driver-Violation and Prohibition Rates (per 100 driver-years) for Drivers Who Completed the Learner Stage – Adjusted for Age at First Learner Licence and Gender

	Violations / Prohibitions		
	GLP	**Pre-GLP**	**% Change**
Pointed Speeding Violations:			
Adjusted Rate	**10.14**	**14.22**	**-28.7%*****
95% Confidence Interval	±0.19	±0.19	±1.5
Other Pointed-Violations – excluding breach of licence restrictions:			
Adjusted Rate	**4.05**	**5.4**	**-24.4%*****
95% Confidence Interval	±0.12	±0.11	±2.6
12/24 Hour Prohibitions:			
Adjusted Rate	**1.43**	**1.31**	**+4.9%**
95% Confidence Interval	±0.07	±0.06	±5.7
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**3.92**	**0.98**	**+301.1%*****
95% Confidence Interval	±0.11	±0.05	±20.2
Driver-years	107,074	156,131	
Total Drivers	38,631	56,733	

**** Statistically significant, P<0.0001*

When compared to the results in Table 44, the results in Tables 46, 47, and 48 show that adjusting for age, gender, and driver-time differences between the GLP and Pre-GLP groups. After adjustment for these two factors, the percentage difference in rates was greater for the speeding and other pointed violation categories, and lower for prohibitions and suspensions. than it was before adjustment – by about 7-9 percentage points. In

contrast, there is less of a difference between the GLP and Pre-GLP adjusted rates for 12/24-hour prohibitions, and driving prohibitions and/or suspensions.

5.7.2 Learner Drivers

Table 49 shows unadjusted violation rates for GLP and Pre-GLP drivers during the Learner stage. As anticipated, the magnitudes of the rates are much lower than the rates computed for the entire study period. However, the differences observed between the GLP and Pre-GLP drivers are in the same direction as were observed for all drivers over the entire study period. For the two moving violation categories (speeding violations and other pointed violations) GLP Learner drivers had lower rates than did Pre-GLP Learners. For the two categories of prohibitions, GLP Learners had higher rates than did Pre-GLP Learners. All of the differences in rates between the two groups were statistically significant (P<0.05).

Table 49: Percentage Change in Learner Driver-Violation and Prohibition Rates (per 100 driver-years)

	Violations / Prohibitions		
	GLP	**Pre-GLP**	**% Change**
Pointed Speeding Violations:			
Number	338	300	
Rate	**0.86**	**1.00**	**-20.5%***
95% Confidence Interval	±0.09	±0.12	±13.4
Other Pointed-Violations – excluding breach of licence restrictions:			
Number	661	695	
Rate	**1.67**	**2.49**	**-32.9%*****
95% Confidence Interval	±0.13	±0.19	±7.5
12/24 Hour Prohibitions:			
Number	219	112	
Rate	**0.55**	**0.40**	**+38.0%***
95% Confidence Interval	±0.07	±0.07	±35.8
Driving-Behaviour Related Prohibitions/Suspension:			
Number	368	27	
Rate	**0.93**	**0.10**	**+862.0%*****
95% Confidence Interval	±0.10	±0.04	±494.0
Driver-years	39,491	27,874	-
Total Drivers	45,418	67,075	-

** Statistically significant, P<0.05* **** Statistically significant, P<0.0001*

Table 50 provides the results of adjusting the violation rates for age and gender. Once again the results are in the expected direction, but the percentage change is somewhat lower, for each category. In fact, for speeding, the difference between the GLP and Pre-GLP adjusted rates is no longer statistically significant.

Table 50: Percentage Change in Learner Driver-Violation and Prohibition Rates (per 100 driver-years) – Adjusted for Age at First Learner Licence and Gender

	Violations / Prohibitions		
	GLP	**Pre-GLP**	**% Change**
Pointed Speeding Violations:			
Adjusted Rate	**0.56**	**0.64**	**-11.4%**
95% Confidence Interval	±0.07	±0.09	±15.1
Other Pointed-Violations – excluding breach of licence restrictions:			
Adjusted Rate	**1.16**	**1.49**	**-22.5%*****
95% Confidence Interval	±0.11	±0.14	±8.8
12/24 Hour Prohibitions:			
Adjusted Rate	**0.28**	**0.17**	**+71.4%*****
95% Confidence Interval	±0.05	±0.05	±45.0
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**0.60**	**0.05**	**+1037.1%*****
95% Confidence Interval	±0.08	±0.03	±586.0
Driver-years	39,491	27,874	-
Total Drivers	45,418	67,075	-

** Statistically significant, P<0.05* **** Statistically significant, P<0.0001*

Table 51 shows the percentage change in violation rates between GLP and Pre-GLP Learner drivers after adjusting for age, gender, and for the time at risk. For the results shown in Table 51, the denominator was adjusted to take into account the shorter learner term for Pre-GLP Learners. After adjusting for the administrative change to the Learner term, only the percentage changes computed for the category of Prohibitions /Suspensions remained statistically significant.

Table 51: Percentage Change in Learner Driver-Violation and Prohibition Rates (per 100 driver-years) – Adjusted for Age at First Learner Licence, Gender, and for shorter Learner Term for Pre-GLP Learners

	Violations / Prohibitions		
	GLP	**Pre-GLP**	**% Change**
Pointed Speeding Violations:			
Adjusted Rate	**0.57**	**0.56**	**+1.3%**
95% Confidence Interval	±0.07	±0.08	±17.4
Other Pointed-Violations – excluding breach of licence restrictions:			
Adjusted Rate	**1.17**	**1.32**	**-11.1%***
95% Confidence Interval	±0.11	±0.13	±10.2
12/24 Hour Prohibitions:			
Adjusted Rate	**0.29**	**0.14**	**+99.3%***
95% Confidence Interval	±0.05	±0.04	±52.5
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**0.60**	**0.05**	**+1214.9%***
95% Confidence Interval	±0.08	±0.02	±678.2
Driver-years	39,491	27,874	
Total Drivers	45,418	67,075	

* *Statistically significant, P<0.05* *** *Statistically significant, P<0.0001*

Table 52 shows the results of the analysis of Learner violations when the sample was restricted to drivers who graduated to the Novice stage before the end of the study period. For these drivers, the magnitude of the percentage change between GLP and Pre-GLP drivers, for all pointed violations, was almost as high as it was for all of the drivers in the study (see Table 50) but, for speeding, it was much lower. The prohibition / suspension rates remained much higher for GLP than for Pre-GLP drivers.

Table 52: Percentage Change in Learner Age- and Gender-adjusted Learner Driver-Violation and Prohibition Rates (per 100 driver-years) - For Drivers who Completed the Learner Stage

	Violations / Prohibitions		
	GLP	**Pre-GLP**	**% Change**
Pointed Speeding Violations:			
Adjusted Rate	**0.51**	**0.54**	**-4.7%**
95% Confidence Interval	±0.08	±0.10	±23.5
Other Pointed-Violations – excluding breach of licence restrictions:			
Adjusted Rate	**0.89**	**1.12**	**-20.6%***
95% Confidence Interval	±0.11	±0.14	±13.1
12/24 Hour Prohibitions:			
Adjusted Rate	**0.16**	**0.11**	**+51.3%***
95% Confidence Interval	±0.05	±0.04	±70.6
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	0.64	0.05	**+1,107.2%*****
95% Confidence Interval	±0.09	±0.03	±764.0
Driver-years	27,488	21,023	-
Total Drivers	38,361	56,733	-

** Statistically significant, P<0.05* **** Statistically significant, P<0.0001*

5.7.3 Novice Drivers

Tables 53 and 54 show the results of the violation rate comparisons conducted for Novice drivers. Here, as might be expected, the magnitudes of the rates are much higher than were seen with Learner drivers.

Table 53: Percentage Change in Novice Driver-Violation and Prohibition Rates (per 100 driver-years)

	Violations / Prohibitions		
	GLP	**Pre-GLP**	**% Change**
Pointed Speeding Violations:			
Number	13,911	24,355	
Rate	**18.82**	**19.44**	**-3.2%***
95% Confidence Interval	±0.30	±0.24	±2.0
Other Pointed-Violations – excluding breach of licence restrictions:			
Number	20,287	35,811	
Rate	**6.67**	**7.06**	**-5.5%****
95% Confidence Interval	±0.18	±0.14	±3.2
12/24 Hour Prohibitions:			
Number	2,441	3,244	
Rate	**3.07**	**2.40**	**+27.7*****
95% Confidence Interval	±0.12	±0.08	±6.9
Driving-Behaviour Related Prohibitions/Suspension:			
Number	6,578	2,156	
Rate	**8.27**	**1.60**	**+417.9%*****
95% Confidence Interval	±0.20	±0.07	±0.0
Driver-years	79,588	135,111	
Total Drivers	38,632	56,735	

** Statistically significant, P<0.05* *** Statistically significant, P<0.001* **** Statistically significant, P<0.0001*

Clearly, once drivers leave the supervised Learner stage and begin driving solo, both their crash and violation rates increase considerably. However, in contrast to the results of the crash rate data, Novice drivers in GLP were convicted of fewer driving-related violations than were Pre-GLP drivers. The magnitude of the difference is quite small before adjustment for age and gender (Table 53), but both before and after adjustment for these two factors (Table 54), the difference is statistically significant.

Table 54: Percentage Change in New Driver-Violation and Prohibition Rates (per 100 driver-years) – Adjusted for Age at First Novice Licence and Gender

	Violations / Prohibitions		
	GLP	**Pre-GLP**	**% Change**
Pointed Speeding Violations:			
Adjusted Rate	**10.95**	**13.26**	**-17.5%*** **
95% Confidence Interval	±0.23	±0.19	±1.7
Other Pointed-Violations – excluding breach of licence restrictions:			
Adjusted Rate	**5.03**	**5.94**	**-15.3%*** **
95% Confidence Interval	±0.16	±0.13	±2.9
12/24 Hour Prohibitions:			
Adjusted Rate	**1.92**	**1.64**	**+16.9*** **
95% Confidence Interval	±0.10	±0.07	±6.4
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**5.19**	**1.17**	**+344.5%*** **
95% Confidence Interval	±0.16	±0.06	±22.5
Driver-years	79,588	135,111	
Total Drivers	38,632	56,735	

*** *Statistically significant, P<0.0001*

5.7.4 Effect of the Extended Learner Stage

To explore the extent to which the extended Learner stage for GLP drivers might have influenced the new driver and Novice driver age- and gender-adjusted relative risks for violations and prohibitions, additional Poisson regression models were developed. In these analyses, the number of actively licensed learner months was included as a factor in each risk model. The results of these analyses are summarised in Table 55.

Table 55: Comparison (% Change) of Violations Rates (± 95% Confidence Interval) After Adjustment for Age at First Learner's, Gender, and Number of Months as a Learner-Driver

Pointed Speeding Violations Only	Percentage Change
All New Drivers	GLP – 0.2% higher than Pre-GLP group
All New Drivers – who only obtained 1 Learner licence with no subsequent renewal or progress, were assumed to have licence issue term of 1 full year (same as GLP drivers).	GLP – 1.9% higher than Pre-GLP group
All New Drivers – who successfully completed their Learner stage	GLP – 4.3% lower than Pre-GLP group**
Novice Drivers Only	GLP – 6.2% lower than Pre-GLP group***
Other Pointed Violations – Excluding Breaches	**Percentage Change**
All New Drivers	GLP – 5.8% lower than Pre-GLP group*
All New Drivers –who only obtained 1 Learner licence with no subsequent renewal or progress, were assumed to have licence issue term of 1 full year (same as GLP drivers).	GLP – 4.1% lower than Pre-GLP group*
All New Drivers – who successfully completed their Learner stage	GLP – 9.0% lower than Pre-GLP group ***
Novice Drivers Only	GLP – 8.5% lower than Pre-GLP group ***
12/24-Hour Prohibitions Only	**Percentage Change**
All New Drivers	GLP – 34.1% higher than Pre-GLP group ***
All New Drivers – who only obtained 1 Learner licence with no subsequent renewal or progress, were assumed to have licence issue term of 1 full year (same as GLP drivers).	GLP – 36.8% higher than Pre-GLP group ***
All New Drivers – who successfully completed their Learner stage	GLP – 25.7% higher than Pre-GLP group ***
Novice Drivers Only	GLP – 25.7% higher than Pre-GLP group ***
Driving Behaviour-Related Prohibitions /Suspensions	**Percentage Change**
All New Drivers	GLP – 481.4% higher than Pre-GLP group ***
All New Drivers – who only obtained 1 Learner licence with no subsequent renewal or progress, were assumed to have licence issue term of 1 full year (same as GLP drivers).	GLP – 485.9% higher than Pre-GLP group ***
All New Drivers – who successfully completed their Learner stage	GLP – 460.6% higher than Pre-GLP group ***
Novice Drivers Only	GLP – 447.4% higher than Pre-GLP group ***

** Statistically significant, P<0.05* *** Statistically significant, P<0.001* **** Statistically significant, P<0.0001*

For the categories of speeding and other pointed violations, the magnitudes of the differences observed between the GLP and Pre-GLP rates prior to adjustment for the length of the learner stage have been reduced. For the two prohibition categories, the magnitudes of the differences have been increased. Where there were much lower violation rates estimated for the GLP new drivers before adjustment for the longer GLP learner stage, after adjustment the rates for the GLP and Pre-GLP drivers became more similar. The increased magnitude of the difference between the GLP and Pre-GLP groups for the two prohibition categories is likely due to the greater incidence of these types of sanctions among unsupervised drivers.

5.7.5 Summary of Violation and Prohibition Rate Analysis

GLP drivers have lower rates of speeding and other penalty point violations than Pre-GLP drivers, and higher rates of prohibitions and suspensions. The reductions observed in violation rates between GLP and Pre-GLP drivers exceeded those observed for the time-matched experienced driver cohorts. And the experienced drivers followed during the same time period as GLP drivers were found to have lower prohibition / suspension rates than the group of experienced drivers followed during the same time period as the Pre-GLP group. These findings suggest that the violation and prohibition rate differences observed between the GLP and Pre-GLP groups may be associated more with GLP than with other potential explanatory factors external to GLP.

The results of the analyses comparing the violation rates of all GLP and Pre-GLP drivers indicate that, over the entire 3.4 year follow-up period, GLP drivers had a lower incidence of speeding and other pointed violations violations than Pre-GLP drivers. When all drivers were included in the analysis, this relationship was sustained after adjustments for age and gender, but not after adjustment for the extended GLP Learner stage. However, the violation rates for Novice drivers and for drivers who graduated to the Novice stage during the study period, remained lower after adjustment for all three factors. These findings suggest that, while much of the reduction in overall violation rates between GLP and Pre-GLP drivers may be attributable to the extended GLP Learner stage, some of the observed reduction may in fact be due to a change in driving behaviours, at least for those drivers who progressed to the Novice stage during the course of the study. Although the percentage reduction in violation rates associated with these drivers was statistically significant, it should be noted that the magnitude of the percentage difference was relatively small ranging from about 4-7%. Further research is required before firm conclusions about the impact of GLP on the safe driving behaviours of new drivers can be drawn.

This study did provide strong evidence that the lower penalty point threshold is being used to impose driving prohibitions on GLP drivers more frequently than was done with Pre-GLP drivers. As well, the 12- and 24-hour administrative prohibitions are being used more frequently to sanction drivers who are suspected of drinking and driving. These trends were found consistently, for Learner drivers, Novice drivers, and for all new drivers followed for the entire study period. They were also maintained after the rates were adjusted for age and gender differences between the groups, and after adjustment for the extended GLP Learner stage. Thus, it is clear that the sanctions that have been put in place to enforce GLP restrictions, and to deter new drivers from engaging in illegal and unsafe driving behaviours are being used. As the use of these sanctions becomes more commonly known among the new driver population, their deterrent effect may increase.

Section 6. Driver Education and GLP Driver Crashes and Violations

Another important factor that has not yet been considered in the evaluation of GLP is the role of driver education. As described in an earlier chapter, GLP drivers were offered the opportunity to reduce the length of their Learner stage by up to 3 months if they completed an ICBC-approved driver education course. Consequently, much effort was put towards the development of a driver education curriculum that as part of the development and implementation of GLP much effort went into the development of an improved driver education curriculum that would be the standard for all approved driver education courses in the province. As noted in the *GLP Driver Training and Testing Team Transition Report* (2001), "to ensure that [the 3-month] reduction was based on driver training courses that ICBC could fully support, and because of the concern with high crash rates among this group, a decision was made to create a standard curriculum for the province. The goal of this curriculum was to reduce crash rates among new drivers by helping them take responsibility and become 'thinking' drivers. Courses designed from the curriculum were required to have: 1) integrated knowledge, skills, and attitudes, 2) a focus on responsibility and attitudes, and 3) integration between classroom, in-car, and home instruction.

The purpose of the study presented here is to determine to what extent ICBC-approved driver education courses are meeting the goal of crash reduction, and to ascertain whether there is any evidence of a change in the unsafe driving behaviours of new drivers who completed an approved course. The first objective will be addressed by comparing the crash rates of drivers who completed an ICBC-approved course with those who did not; the second objective will be addressed by comparing the violation rates for the same two groups.

Unfortunately, data relating to participation in driver training (ICBC approved or other) is not available from ICBC data systems. It is only possible to ascertain which GLP drivers submitted a Declaration of Completion (DOC). Although it is likely that the majority of drivers who complete the ICBC course will submit a DOC, it is possible that some will not.

6.1 Method

As with the earlier study of GLP and Pre-GLP new drivers, a quasi-experimental research design was employed to investigate relationships between submission of a DOC and crash and violation rates. In contrast to the previous study, however, the No DOC group was time-match to the DOC group. No historical controls were used.

6.1.1 Sample Selection Criteria

The GLP cohort used in the prior analysis of new driver crashes and violations was used in this study. As may be recalled, the inclusion and exclusion criteria for this cohort were as follows:

GLP All new drivers who obtained their very first Learner licence between August 1, 1998 and July 31, 1999.

This study group does not include:

- Out-of-province drivers
- Any driver who received a full privilege licence without first receiving a GLP Novice licence

For the purposes of this study, two subgroups were identified within this cohort:

1) those drivers who submitted a DOC (the DOC group); and
2) those drivers who did not (the No DOC group.

6.1.2 Data Sources

Several data sources were used to gather the information needed to perform the study. More detailed information about the data sources is provided in section 5.1.2.

The **Drivers Licensing System (DLS)** was used to identify the newly licensed GLP drivers, and to obtain pertinent information such as licensing dates, driver's age and gender.

Crash data were obtained from the **Business Information Warehouse Claims (BIWC)** database (as described in Section 4). Data from the **Traffic Accident System (TAS)** were also, but were used primarily to compare crash characteristics that could not be obtained from BIWC.

The **Driver Training School System** was used to identify GLP drivers who submitted a DOC to a Point of Service.

6.1.3 The Study Samples

The GLP sample consisted of the 45,422 drivers who obtained their first Learner licence between August 1, 1998 and July 31, 1999.

Of these, 8,082 (17.8%) submitted a DOC to a Point of Service and 37,340 (82.2%) did not. Of the drivers who submitted a DOC, 6,846 (84.7%) received a time credit of between 10 and 90 days against their Learner stage; 1,236 (15.3%) did not.

6.1.4 Statistical Analysis

As with the cohort study (described in Section 4), count data (Poisson) regression methods were the primary analyses used to compare crash rates of GLP drivers who did and did not submit a DOC. Age, gender, and time at risk were once again used in the models to adjust for potential confounding effects. Analyses were also undertaken to investigate the influence of the length of the Learner stage on the crash rates of those who did and did not submit a DOC (since submission of a DOC can reduce the Learner period by up to 3 months). For some of these analyses, the DOC group was split into two sub-groups; those who submitted a DOC and received a 10-90 day time credit against their Learner stage; and those who submitted a DOC but did not receive a time credit.

6.2 Driver Characteristics

6.2.1 Age and Gender

The mean age, at first Learner licence, of GLP drivers who submitted a DOC was significantly ($P<0.001$) lower (Mean = 17.7 years, SD=5.1 years) than the mean age of drivers with No DOC (Mean=19.5 years, SD=*7.2* years. In both groups, the age range was broad, with the oldest driver in the DOC group aged 72 years, and the oldest driver in the No DOC group aged 79 years.

As shown in Table 56, the percentage of 16 year-old new drivers in both groups was high. However, the percentage of 16 year-old new drivers in the DOC group (80%) was considerably higher than in the No DOC group (65%). Conversely, the percentage of those drivers who obtained their first Learner licence when they were 25 years of age or older was lower in the DOC group (~7%), than in the No DOC group (14%). The association between age and study group membership was statistically significant (P<0.0001)

Table 56: Distribution by Age at Licensing (first Learner licence)

Age in Years	DOC		No DOC	
	N	(%)	N	(%)
16 Years	6,470	(80.1)	24,292	(65.1)
17 Years	455	(5.6)	2,450	(6.6)
18 Years	213	(2.6)	1,458	(3.9)
19 – 21 Years	296	(3.7)	2,551	(6.8)
22 – 24 Years	114	(1.4)	1,347	(3.6)
25 or More Years	533	(6.6)	5,242	(14.0)
TOTAL	8,081	(100.0)	37,340	(100.0)

**no age was recorded for 1 driver in the DOC group*

Table 57: Distribution by Age and Gender

Age in Years	DOC				No DOC			
	Males		Females		Males		Females	
	N	%	N	%	N	%	N	%
16 Years	3,528	83.6	2,941	76.2	13,165	71.7	11,125	58.7
17 Years	252	6.0	203	5.3	1,312	7.1	1,138	6.0
18 Years	123	2.9	90	2.3	690	3.8	768	4.1
19 – 21 Years	117	2.8	179	4.6	1,090	5.9	1,461	7.7
22 – 24 Years	30	0.7	84	2.2	444	2.4	903	4.8
25 or more Years	172	4.1	361	9.4	1,669	9.1	3,573	18.8
All Ages	4,222	100.0	3,858	100.0	18,370	100.0	18,968	100.0

**4 drivers (2 DOC and 2 No DOC) are not included because Age or Gender information was not available.*

Although there was a higher percentage of males (52%) than females (48%) in the DOC group, the distribution of males and females was about equal in the No DOC group. In both groups, drivers who obtained their first Learner licence at 16 years of age were the most common (Table 57). The DOC group had a particularly high

percentage of 16 year-old male drivers (~84%). The No DOC group had a somewhat lower percentage of 16 year-old male drivers (~72%) but the difference between the percentage of 16 year-old males and females was most pronounced in this group.

6.2.2 Length of Time Spent in the Learner Period

The minimum Learner period for GLP drivers is six months. However, this period can be reduced by up to three months for the new drivers who complete an ICBC approved GLP driver education course. Only about 7% of the DOC group completed the Learner period in the minimum time of 90 days (Table 58). However, almost 80% completed it between 3 months and the 6-month (180-day) minimum applicable to the No DOC group.

Table 58: Distribution of GLP Drivers by Length of Learner Period

Length of Learner Period	DOC		No DOC	
	N	%	N	%
90 days or less*	594	7.4	7	0.0
91 – 180 days*	6,436	79.6	1,774	0.1
More than 180 days	1,052	13.0	35,526	99.9
Total New Drivers	8,082	100.0	37,340	100.0

* *Drivers in the DOC group with less than 90 days in the Learner stage, and those in the No DOC group with less than 180 days, either surrendered their licence or had their licence cancelled prior to completing the Learner stage.*

As of December 31, 2001, the average (median) length of the Learner stage for the DOC group was 3.7 months, with a minimum of 3 months, and a maximum of 41 months (Table 59). Not surprisingly, the median Learner period for the No DOC group was significantly ($P<0.0001$) longer at 8.9 months (minimum=0.2, maximum=41.5).

Table 59: Months* Spent in the Learner Stage

Length of Learner Period (in months)	DOC	No DOC
Median	3.7	8.9
Minimum	3.0	0.2
Maximum	41.1	41.5

**One Month = 30 Days.*

6.2.3 Characteristics of Drivers Completing the Learner Phase During the Study Period

By the end of the study period, 7,951 (98%) of the 8,082 members of the DOC group and 30,684 (82%) of the 37,340 members of the No DOC group had successfully completed the Learner stage, and obtained a Novice licence. The age and gender distributions of these drivers are shown in Tables 60 and 61. As shown in Table 60,

drivers who submitted a DOC tended to become Novice drivers at a younger age than drivers who did not submit a DOC. In fact, a much higher percentage of DOC than No DOC drivers were only 16 years old when they successfully completed the Learner stage and became Novice drivers. The association between Novice age and study group membership was statistically significant (P<0.0001).

Table 60: Distribution of Novice Drivers by Age at First Novice Licence

Age in Years	DOC		No DOC	
	N	(%)	N	(%)
16 Years	5,883	(74.0)	15,020	(54.1)
17 Years	816	(10.3)	6,379	(21.1)
18 Years	303	(3.8)	2,477	(5.0)
19–21 Years	327	(4.1)	2,331	(6.3)
22–24 Years	108	(1.4)	976	(2.8)
25 or More Years	514	(6.5)	3,501	(10.8)
TOTAL	7,951	(100.0)	30,684	(100.0)

In both groups, a slightly higher proportion of males than females completed the Learner period before the study end date of December 31, 2000 (Table 61).

Table 61: Gender* Distribution of Novice Drivers

Gender	DOC		No DOC	
	N	(%)	N	(%)
Female	3,768	(47.4)	14,946	(48.7)
Male	4,182	(52.6)	15,736	(51.3)
TOTAL	7,950	(100.0)	30,682	(100.0)

**Gender was not recorded for 1 DOC driver and 2 No DOC drivers.*

6.3 Crash Characteristics

The following section reports on selected characteristics of crashes involving the drivers in each of the study groups. These characteristics were examined for two reasons. Firstly, to ascertain whether drivers who submitted a DOC had different types of crashes than those who did not and secondly, to determine whether there were any differences between the two groups with respect to the percentage of crashes that contravened GLP restrictions. The following specific crash characteristics were compared across the study groups: crash severity, percentage responsibility, alcohol involvement, time of day when the crash occurred, and the passenger profile. Average costs per new driver-involved crash incident were also compared.

The drivers who submitted a DOC were reported to have been involved, as drivers, in 6,208 BIWC crashes during the study period (to December 31, 2001). Drivers who did not submit a DOC were reported to have been

involved in 18,509 crash incidents, as drivers. A much smaller number of crash involvements were reported in TAS, with 1,296 reported for drivers who submitted a DOC and 4,400 for drivers who did not. Due to the small number of crashes reported in TAS, and the similarity of the results obtained from both data sources, TAS crash data are only used to describe crash characteristics that are not available from the BIW claims database (e.g., alcohol involvement, time of day when the crash occurred, and passenger configuration).

6.3.1 Crashes Involving at Least One GLP Driver

Crash Type

During the 3.4 year period studied, there were a total of 23,607 crash incidents involving at least one GLP New Driver. Table 62 shows the distribution of these crashes by crash type and DOC group.

Table 62: Distribution of Crashes Involving at Least 1 GLP New Driver by Type of Crash and DOC Group Membership

Crash Type	DOC		No DOC	
	N	%	N	%
Fatal	7	0.1	25	0.1
Injury	1,358	22.6	4,251	24.2
Material Damage > $1000	4,636	77.3	13,330	75.7
Total Crashes	6,001	100.0	17,606	100.0

The No DOC group had a slightly higher proportion of Injury crashes than the DOC group, but the difference between the proportions was not statistically significant ($P>0.05$).

Crash Costs

Table 63 shows the average (mean and median) claims costs incurred per new driver involved crash. No statistically significant differences were detected between the DOC and No DOC groups with respect to the median claims costs for all crashes combined, Fatal, or PDO crashes ($P=0.33$). However, the DOC group was found to have significantly ($P<0.04$) higher Injury crash costs. The same pattern of results was obtained when the groups were limited to drivers who successfully completed the GLP Learner stage.

Table 63: Average Costs per GLP Driver-Involved Crash Incident

	DOC				No DOC			
Benefits Paid	PDO (n=4,636)	Injury (n=1,358)	Fatal (n=7)	All Crashes (n=6,001)	PDO (n=13,330)	Injury (n=4,251)	Fatal (n=25)	All Crashes (n=17,606)
Mean	$2,214	$28,957	$372,311	$8,697	$2,042	$25,251	$193,421	$7,917
Median*	$734	$13,655	$88,382	$1,416	$781	$13,062	$91,673	$1,490
Standard Deviation	$4,157	$107,913	$704,314	$58,505	$3,542	$84,163	$290,294	$44,519
Minimum**	-$1,443	-$81	$2,500	-$1,443	-$506	-$200	$0	-$506
Maximum	$62,209	$3,231,983	$1,941,700	$3,231,983	$75,000	$3,171,410	$1,158,906	$3,171,410

* *The Median reflects the value that separates a sample in two: 50% having values below the Median value and 50% with values above the Median value*

** *Minimum amounts paid show negative values due to benefit amounts that were recovered (for example, due to payments from another source).*

6.3.2 GLP Drivers involved in at Least One Crash

The total number of new drivers involved in the 23,607 crash incidents was 16,400 (3,939 in the DOC group and 12, 461 in the No DOC group. Table 64 shows the number of new drivers by the number of crash in which they were involved during the study period. A significantly ($P<0.0001$) higher percentage of the drivers who submitted a DOC were involved in at least 1 crash during the study period than of those who did not submit a DOC (47% and 33%, respectively). A higher percentage of the DOC group was also involved in multiple incidents (19% versus 11%).

Table 64: Number of GLP Drivers and the Number of Crashes in Which They Were Involved During the Study Period

Number of Incidents	DOC Drivers		No DOC Drivers	
	N	%	N	%
None	4,143	30.2	24,879	66.6
1	2,441	30.2	8,512	22.8
2	982	12.2	2,776	7.4
3	340	4.2	839	2.3
4 or more	176	2.2	334	0.9
Total Number of New Drivers	8,082	100.0	37,340	100.0

6.3.3 GLP Driver Crash Involvements

The total number of GLP driver crash involvements was 24,267. Bear in mind that these counts include multiple incidents involving the same driver as well as single incidents involving more than one new driver. Table 65 shows the distribution of new driver crashes by the licence stage in which they occurred. For both the DOC and No DOC groups, the highest percentage of crashes occurred during the Novice stage. However, the percentage of crashes that occurred during the Learner stage was higher for the No DOC than the DOC group. This is likely due to the longer Learner stage experienced by the No DOC group.

Table 65: Distribution of GLP Driver Crashes by Licence Stage

Licence Stage	DOC Drivers		No DOC Drivers	
	N	%	N	%
Learner	121	2.0	1,113	6.2
Novice	6,087	98.0	16,946	93.8
Combined	6,208	100.0	18,059	100.0

Percentage Responsibility for Crash

As shown in Table 66, drivers in the No DOC group were more frequently assigned liability for their Learner stage crashes, but DOC drivers had a slightly higher percentage of liable crashes overall. The magnitude of the differences between the groups is relatively minor, however.

Table 66: Distribution of New Driver Crashes by Liability*

Licence Stage	DOC Drivers		No DOC Drivers	
	N	%	N	%
Learner: Liable	75	64.1	755	69.5
Not Liable	42	35.9	332	30.5
Novice: Liable	3,744	64.1	10,146	62.4
Not Liable	2,099	35.9.0	6,111	37.6
Combined: Liable	3,819	64.1	10,901	62.9
Not Liable	2,141	35.9	6,443	37.1

**Liability was not assigned to 963 (4.0%) of the GLP driver crashes: 715 (4%) of the NoDOC crashes and 248 (4%) of the DOC crashes*

6.3.4 Learner Stage Crashes

All of the drivers in both the DOC and No Doc groups were subject to the GLP Learner restrictions. The Learner stage crashes were compared, to determine if they might be indicative of different patterns of compliance within these two groups – at least among drivers who are involved in crashes. Under conditions of perfect compliance no crashes should occur between midnight and 5:00 AM, alcohol should not be identified as a contributing factor

for the new driver, and all of the crashes should have a passenger profile consisting of at least one adult over the age of 16 and no more than 2 passengers in the vehicle.

As noted earlier, these attributes of Learner crashes are only available from TAS, so the number of crashes reported below are much smaller than those reported previously (from the BIWC).

Time of Learner-involved Crashes

As shown in Table 67, a much larger percentage (10% versus 3%) of the Learner crashes experienced by members of the No DOC group (relative to the DOC group) occurred between midnight and 5:00 AM – a time when Learners are not permitted to drive. The difference was not statistically significant ($P<0.05$), but the number of police reported crashes is very small, particularly for the DOC group. Thus, it would be difficult to detect anything but very large differences.

Table 67: Distribution of GLP Driver Crashes by Time of Crash*

Time of Crash	DOC Drivers		No DOC Drivers	
	N	%	N	%
Midnight –5 AM	1	3.2	68	10.2
5:01 AM – 4:00 PM	14	45.2	280	42.0
4:01 PM – 11:59 PM	15	48.4	298	44.7
Time Not Available	1	3.2	21	3.2
Total Crashes	31	100.0	667	100.0

As shown in Table 68, alcohol was reported to be a contributing factor for very few of the Learner drivers involved in crashes. In fact, although ~7% of No DOC drivers were reported to have alcohol involvement as a contributing factor in their crash, no such crashes were observed for the Learner drivers in the DOC group. While this difference between the DOC and No DOC groups appears large, it was not statistically significant ($P>0.05$). Moreover, a potentially confounding factor in the analysis of alcohol involved crashes is the significantly higher proportion of 16 year olds in the DOC cohort. Both impaired and late night driving tend to be more characteristic of somewhat older drivers. However, the very small number of crashes available for this analysis, does not lend itself to additional subgroup comparisons. Further exploration of these relationships may be undertaken when more data are available.

The distribution of the passenger configurations (Table 68) of the crashes involving drivers in the DOC and No DOC groups show the same pattern as the night-time and alcohol-involved crashes: a higher percentage of the No DOC than DOC drivers appear to have been non-compliant at the time of their crash. While none of the differences between the groups was statistically significant, the consistency in the pattern is suggestive. However, the small numbers and the likelihood of significant confounding due to the differences between the age and gender distributions of the two groups suggests that the results be interpreted with considerable caution.

Table 68: Distribution of Learner Crashes by Alcohol Involvement and Passenger Profile

		DOC		No DOC	
		N	%	N	%
Alcohol Involved	Yes	0	0.0	49	7.3
	No/Don't Know	31	100.0	619	92.7
	Total	31	100.0	290	100.0
Passenger Profile	At least one Adult & No More than one other Passenger	17	54.8	272	40.7
	No Passengers	5	16.1	214	32.0
	No Adult Passenger	6	19.4	91	13.6
	All Other Combinations	3	9.7	91	13.6
	Total	31	100.0	290	100.0

6.4 Characteristics of GLP Driver Violations and Prohibitions

6.4.1 Violations

A total of 39,862 violations (with convictions) were reported for GLP drivers during the study period: 8,871 for GLP drivers who submitted a DOC and 30,991 for those who did not. As observed in the comparison of GLP and Pre-GLP drivers, the majority (>75%) of these violations were committed by males.

Table 69 shows the distribution of new driver violations by violation type. In all instances, only violations for which the driver was convicted are included.

Speeding accounted for the highest percentage of all of the violations for both DOC and No DOC drivers. The second most common violation was for breach of licence restriction. In contrast to the analysis of GLP and Pre-GLP drivers, breaches do not have to be excluded from the analysis of violations here. All of the drivers in this section were subject to the same rules and sanctions. Consequently, in all of the following analyses, all violations (breaches included) will be examined.

Table 69: Distribution of GLP Driver Violations

Violation Type	DOC		No DOC	
	N	%	N	%
General Speeding	3,539	39.9	10,678	34.5
Dangerous Driving – alcohol, criminal code and excessive speeding convictions	376	4.2	1,172	3.8
Without Due Care and Attention	130	1.5	551	1.8
Other Moving Violations	998	11.3	3,270	10.6
Non-Moving Violations	1,079	12.2	4,663	15.1
12- and 24- Hour Prohibitions	524	5.9	2,136	6.9
Breach of Licence Restrictions	2,225	25.1	8,521	27.5
Total Violations	8,871	100.0	30,991	100.0

In the following tables, the distribution of the number and types of violations committed by new drivers during the Learner and Novice stages of their licensing process are provided. As shown in Table 70, for both groups, most of the violations committed during the Learner stage were breach of licence restrictions. However, the No DOC group had a higher percentage of non-moving violations, while the DOC group had higher frequencies of speeding and other moving violations.

Table 70: Distribution of Learner Driver Violations

Violation Type	DOC		No DOC	
	N	%	N	%
General Speeding	18	16.5	288	10.1
Dangerous Driving – alcohol, criminal code and excessive speeding convictions	1	0.9	100	3.5
Without Due Care and Attention	2	1.8	40	1.4
Other Moving Violations	14	12.8	211	7.4
Non-Moving Violations	15	13.8	688	24.0
12- and 24- Hour Prohibitions	9	8.3	210	7.3
Breach of Licence Restrictions	50	45.9	1,330	46.4
Total Violations	109	100.0	2,867	100.0

A somewhat different picture is observed with Novice drivers (Table 71). The distribution of violations is much more similar across the DOC and No DOC groups. And, speeding violations, rather than breach of licence restrictions, were the most common. Breach of licence restrictions accounted for only about 25% of all of the Novice driver violations.

Table 71: Distribution of Novice Driver Violations

Violation Type	DOC		No DOC	
	N	%	N	%
General Speeding	3,521	40.2	10,390	36.9
Dangerous Driving – alcohol, criminal code and excessive speeding convictions	375	4.3	1,072	3.8
Without Due Care and Attention	128	1.5	511	1.8
Other Moving Violations	984	11.2	3,059	10.9
Non-Moving Violations	1,064	12.1	3,975	14.1
12- and 24- Hour Prohibitions	515	5.9	1,926	6.9
Breach of Licence Restrictions	2,175	24.8	7,191	25.6
Total Violations	46,157	100.0	36,886	100.0

6.4.2 Prohibitions and Suspensions

In British Columbia, penalty points are assigned to drivers who breach certain sections of the *Motor Vehicle Act* (or *Motor Vehicle Act Regulations*). In general, a higher pointed violation reflects a more serious violation. GLP drivers (whether in the DOC or Non-DOC group) are subject to a lower penalty-point threshold than new drivers were prior to GLP. Once the threshold is reached, new drivers may be subject to a review of their driver record, and a possible driving prohibition. Prohibitions can also be incurred for criminal code and other driving-related infractions.

Table 72 shows the distribution of violations by their point value. Only minor differences in the pattern of pointed violations was observed between the DOC and No DOC groups.

Table 72: GLP Driver Violations by Number of Penalty Points

Number of Penalty Points	DOC		No DOC	
	N	%	N	%
2-Point Violations	564	6.4	1,797	5.8
3-Point Violations	6,609	74.5	22,150	71.5
6-Point Violations	130	1.5	551	1.8
10-Point Violations	24	0.3	207	0.7
No-Point Violations	1,544	17.4	6,286	20.3
Total Violations	8,871	100.0	30,991	100.0

Table 73 shows the number of driving prohibitions and licence suspensions incurred by drivers in the DOC and No DOC groups. The vast majority of prohibitions, in both groups, were the result of an Office of the Superintendent of Motor Vehicle review of the driver's driving record. Few differences in the pattern of suspension types were observed between the DOC and No DOC groups.

Table 73: GLP Driver Prohibitions and Suspensions by Type

Type of Prohibition or Suspension	DOC		No DOC	
	N	%	N	%
OSMV* - Driving Record	1,622	97.4	5,095	96.4
Court Ordered- Driving Record	11	0.7	26	0.5
Court Ordered -Criminal Code	3	0.2	23	0.4
Court Ordered – Automatic 12 Month	7	0.4	55	1.0
Administrative Driving Prohibition	16	1.0	58	1.1
OSMV Indefinite Licence Suspension	3	0.2	27	0.5
Fitness to Driver	1	0.1	0	0.0
Young Offender Act or Term of Probation	3	0.2	1	0.0
Total Prohibitions and Suspension	1,666	100.0	5,285	100.0

**Office of the Superintendent of Motor Vehicles*

Table 74 shows the number of driving prohibitions and licence suspensions that were handed out per driver, in each cohort. Drivers with more than 1 prohibition or suspension may have received them as a result of the same incident and served the terms concurrently. A total of 1,327 (16.4%) of the DOC drivers and 4,244 (11.4%) of No DOC drivers received at least 1 driving behaviour-related prohibition during the study period.

Table 74: Driving Behaviour-Related* Prohibitions and Suspensions Per Driver

Number of Prohibitions or Suspensions Per Driver	DOC		No DOC	
	N	%	N	%
0	6,755	83.6	33,096	88.6
1	1,039	12.9	3,397	9.1
2	251	3.1	729	2.0
3	30	0.4	79	0.2
4	4	0.1	14	0.0
5	3	0.0	14	0.0
6	0	0.0	11	0.0
Total Drivers	8,082	100.0	37,340	100.0

**Fitness to Drive, Young Offender Act, and Term of Probation prohibitions have been excluded*

Table 75 shows the number of new driver prohibitions and suspensions by when they occurred. Once again, only driving behaviour-related prohibitions have been included. As shown, the vast majority occurred during the Novice (unsupervised) stage of driving, for both groups. However, a somewhat higher percentage of prohibitions were handed out to DOC Novice drivers than to No DOC Novices.

Table 75: Driving Behaviour-Related* Prohibitions and Suspensions by Licence Stage

Licence Stage	DOC		No DOC	
	N	%	N	%
Learner	8	1.2	360	5.3
Novice	1,654	98.8	4,924	94.7
Total	1,662	100.0	5,284	100.0

**Fitness to Drive, Young Offender Act, and Term of Probation prohibitions have been excluded*

6.5 Analysis of Crash Rates

6.5.1 All GLP Drivers

As noted previously, in order to compare the relative risk of crashes for the DOC and No DOC groups, an adjustment has to be made for the varying lengths of follow-up available for each driver. As in the Pre-GLP to GLP comparisons, this was accomplished by using actively licensed driver-years as the rate denominator rather than just the number of persons. Two sets of analyses were performed: 1) with all GLP drivers included, regardless of their progress through the program, and 2) with only those drivers who advanced to the Novice stage during the study period.

Table 76 shows the crash rates for GLP drivers, by whether or not they submitted a DOC. Rates are provided for all crashes, liable crashes, casualty and property damage only crashes. In all cases, the crash rates associated with DOC drivers were higher than those associated with the No DOC group. To determine if these higher rates were statistically significant, Poisson regression models were run to compare both the unadjusted and adjusted rates. Models were constructed using age at licensing, and gender as potential confounders. Across all categories of crashes, drivers who submitted a DOC had significantly higher crash rates than those who did not submit a DOC (Table 76). Similar results were obtained when the groups were limited to drivers who graduated to the Novice stage during the study period (Table77).

Table 76: Percentage Change in GLP Driver Crash Involvement Rates (per 100 driver-years)

	BIW Crashes		
	DOC	**No DOC**	**% Change**
All New Driver Crashes			
Number	6,207	18,059	
Rate	28.2	18.6	**+51.6%*** **
95% Confidence Interval	± 0.7	± 0.3	± 4.4
New Driver Liable[#] Crashes Only			
Number	3,818	10,901	
Rate	17.4	11.2	**+54.4*** **
95% Confidence Interval	± 0.6	± 0.2	± 5.8
New Driver Crashes with Property Damage Only			
Number	4,785	13,673	
Rate	21.7	14.1	**+54.3*** **
95% Confidence Interval	± 0.6	± 0.2	± 5.2
New Driver Casualty Crashes			
Number	1,422	4,386	
Rate	6.5	4.5	**+43.0*** **
95% Confidence Interval	± 0.3	± 0.1	± 8.8
Licensed-years	22,012	97,064	
Total Drivers	8,080	37,338	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

*** *Statistically significant, P<0.0001*

Table 77: Percentage Change in GLP Driver Crash Involvement Rates (per 100 driver years) for Drivers Who Successfully Completed the Learner Stage During the Study Period

	BIW Crashes		
	DOC	No DOC	% Change
All New Driver Crashes			
Number	6,203	17,690	
Rate	28.5	20.7	**+37.4*** **
95% Confidence Interval	± 0.7	± 0.3	± 4.0
New Driver Liable[#] Crashes Only			
Number	3,814	10,612	
Rate	17.5	12.4	**+40.8*** **
95% Confidence Interval	± 0.6	± 0.2	± 5.3
New Driver Crashes with Property Damage Only			
Number	4,782	13,412	
Rate	22.0	15.7	**+39.7*** **
95% Confidence Interval	± 0.6	± 0.3	± 4.7
New Driver Casualty Crashes			
Number	1,421	4,278	
Rate	6.5	5.0	**+30.2*** **
95% Confidence Interval	± 0.3	± 0.2	± 4.7
Licensed-years	21,769	85,306	
Total Drivers	7,949	30,682	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

****Statistically significant, P<0.0001*

As can be seen from a comparison of Tables 76 – through 79, adjusting for age and gender had a slightly attenuating effect on the comparison of the DOC to No DOC overall crash rates.

Tables 80 through 85 show the analyses of Learner and Novice crash rates by DOC submission. Unadjusted rate comparisons and age- and gender-adjusted rate comparisons are provided. As was seen with the comparison of overall rates, adjusting for age and gender had a slightly attenuating effect on the comparison of the DOC to No DOC Novice rates, and an enhancing effect on the comparison of the Learner rates. This latter finding may be due to the significantly higher proportion of 16 year-old drivers in the DOC group. As mentioned in Section 4,

the youngest Learner drivers tend to have significantly lower crash rates than their older counterparts. Thus, after age adjustment there would be an increase in the expected number of crashes for the DOC group, and consequently a larger percentage difference between the crash rates of the DOC and No DOC group.

Table 78: Estimated Percentage Change in Age- and Gender- Adjusted GLP Driver Crash Involvement Rates (per 100 driver-years)

	Claims Crashes		
	DOC	No DOC	% Change
All New Driver Crashes:			
Adjusted Rate	26.1	18.0	**+44.8*****
95% Confidence Interval	± 0.7	± 0.3	± 4.3
New Driver Liable# Crashes:			
Adjusted Rate	15.8	10.7	**+46.9*****
95% Confidence Interval	± 0.5	± 0.2	± 5.5
New Driver Crashes with Property Damage Only:			
Adjusted Rate	20.0	13.6	**+47.3*****
95% Confidence Interval	0.6	0.2	± 5.0
New Driver Casualty Crashes:			
Adjusted Rate	6.0	4.4	**+37.1*****
95% Confidence Interval	.± 0.3	± 0.1	± 8.5
Driver-years	22,012	97,064	
Total Drivers	8,080	37,338	

A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible

****Statistically significant, P<0.0001*

Table 79: Estimated Percentage Change in Age- and Gender- Adjusted GLP Driver Crash Involvement Rates (per 100 driver years) - for Drivers Who Successfully Completed the Learner Stage During the Study Period

	Claims Crashes		
	DOC	No DOC	% Change
All New Driver Crashes:			
Adjusted Rate	27.5	20.4	**+34.9*** **
95% Confidence Interval	± 0.7	± 0.3	± 4.0
New Driver Liable[#] Crashes:			
Adjusted Rate	16.6	12.1	**+37.6*** **
95% Confidence Interval	± 0.5	± 0.2	± 5.2
New Driver Crashes with Property Damage Only:			
Adjusted Rate	21.1	15.4	**+37.1*** **
95% Confidence Interval	± 0.6	± 0.3	± 4.6
New Driver Casualty Crashes:			
Adjusted Rate	6.3	4.9	**+27.9*** **
95% Confidence Interval	± 0.3	± 0.2	± 7.9
Driver-years	21,769	85,306	
Total Drivers	7,949	30,682	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

****Statistically significant, P<0.0001*

Table 80: Percentage Change in Learner Driver Crash Involvement Rates (per 100 driver-years) – All Learner Drivers

	Claims Crashes		
	DOC	No DOC	% Change
All Learner Driver Crashes:			
Number	121	1,113	
Adjusted Rate	3.8	3.1	**+25.5%***
95% Confidence Interval	± 0.7	± 0.2	±25.2
Learner Driver Liable[#] Crashes:			
Number	75	755	
Adjusted Rate	2.4	2.1	**+14.7%**
95% Confidence Interval	± 0.5	± 0.2	± 29.6
Learner Driver Crashes with Property Damage Only:			
Number	94	812	
Adjusted Rate	3.0	2.2	**+33.7***
95% Confidence Interval	± 0.6	± 0.2	± 30.9
Learner Driver Casualty Crashes:			
Number	27	301	
Adjusted Rate	0.9	0.8	**+3.6%**
95% Confidence Interval	± 0.3	± 0.10	± 46.9
Driver-years	3,148	36,343	
Total Drivers	8,080	37,338	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

* *Statistically significant, P<0.05*

Table 81: Percentage Change in Learner Driver Crash Involvement Rates (per 100 driver-years) – for Drivers Who Successfully Completed the Learner Stage During the Study Period

	BIW Crashes		
	DOC	No DOC	% Change
All Learner Driver Crashes:			
Adjusted Rate	4.0	2.9	**+36.9***
95% Confidence Interval	± 0.7	± 0.2	± 28.7
Learner Driver Liable[#] Crashes:			
Adjusted Rate	2.4	1.9	**+35.4***
95% Confidence Interval	± 0.6	± 0.2	± 29.0
Learner Driver Crashes with Property Damage Only:			
Adjusted Rate	3.1	2.2	**+39.8***
95% Confidence Interval	± 0.6	± 0.2	± 33.7
Learner Driver Casualty Crashes:			
Adjusted Rate	0.9	0.8	**+14.0**
95% Confidence Interval	± 0.3	± 0.1	± 54.0
Driver-years	2,904	24,584	
Total Drivers	7,949	30,682	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

* *Statistically significant, P<0.05*

Table 82: Estimated Percentage Change in Age- and Gender- Adjusted Learner Driver Crash Involvement Rates (per 100 driver-years)

	Claims Crashes		
	DOC	No DOC	% Change
All Learner Driver Crashes:			
Adjusted Rate	3.8	2.7	**+38.8****
95% Confidence Interval	± 0.7	± 0.2	± 28.2
Learner Driver Liable[#] Crashes:			
Adjusted Rate	2.4	1.9	**+26.6**
95% Confidence Interval	± 0.5	± 0.1	± 33.0
Learner Driver Crashes with Property Damage Only:			
Adjusted Rate	3.0	2.0	**+47.8****
95% Confidence Interval	± 0.6	± 0.2	± 34.5
Learner Driver Casualty Crashes:			
Adjusted Rate	0.8	0.7	**+14.7**
95% Confidence Interval	± 0.3	± 0.1	± 52.5
Driver-years	3,148	36,343	
Total Drivers	8,080	37,338	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

* *Statistically significant, P<0.05* ** *Statistically significant, P<0.001*

Table 83: Estimated Percentage Change in Age- and Gender- Adjusted Learner Driver Crash Involvement Rates (per 100 driver-years) – for drivers who successfully completed the Learner stage during the study period

	Claims Crashes		
	DOC	No DOC	% Change
All Learner Driver Crashes:			
Adjusted Rate	4.0	2.7	**+48.4*** **
95% Confidence Interval	± 0.7	± 0.2	± 31.3
Learner Driver Liable[#] Crashes:			
Adjusted Rate	2.4	1.7	**+38.2***
95% Confidence Interval	± 0.6	± 0.2	± 38.1
Learner Driver Crashes with Property Damage Only:			
Adjusted Rate	3.1	2.1	**+51.2****
95% Confidence Interval	± 0.6	± 0.2	± 36.7
Learner Driver-Casualty-Crashes:			
Adjusted Rate	0.9	0.7	**+23.9**
95% Confidence Interval	± 0.3	± 0.1	± 59.4
Driver-years	2,904	24,584	
Total Drivers	7,949	30,682	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

**Statistically significant, P<0.05* ***Statistically significant, P<0.001* ****Statistically significant, P<0.0001*

Table 84: Percentage Change in Novice Driver Crash Involvement Rates (per 100 driver-years) – ALL Novice Drivers

	BIW Crashes		
	DOC	No DOC	% Change
All Novice Driver Crashes:			
Number	6,087	16,946	
Rate	32.3	27.9	**+15.6*** **
95% Confidence Interval	± 0.8	± 0.4	± 3.4
Novice Driver Liable[#] Crashes Only:			
Number	3,744	10,146	
Rate	19.5	16.4	**+18.6*** **
95% Confidence Interval	± 0.6	± 0.3	± 4.5
Novice Driver Crashes with Property Damage Only:			
Number	4,692	12,861	
Rate	24.4	20.8	**+17.3*** **
95% Confidence Interval	± 0.7	± 0.4	± 4.0
Novice Driver Casualty Crashes:			
Number	1,395	4,085	
Rate	7.2	6.6	**9.8***
95% Confidence Interval	± 0.4	± 0.2	± 6.8
Licensed-years	18,867	60,721	
Total Drivers	7,950	30,682	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

[*] *Statistically significant, P<0.05* ***Statistically significant, P<0.0001*

Table 85: Estimated Percentage Change in Age- and Gender- Adjusted Novice Driver Crash Involvement Rates (per 100 driver-years)

	Claims Crashes		
	DOC	No DOC	% Change
All Novice Driver Crashes:			
Adjusted Rate	31.2	27.3	**+14.0*** **
95% Confidence Interval	± 0.8	± 0.4	± 3.4
Novice Driver Liable[#] Crashes:			
Adjusted Rate	18.7	15.9	**+17.6*** **
95% Confidence Interval	± 0.6	± 0.3	± 4.6
Novice Driver Crashes with Property Damage Only:			
Adjusted Rate	25.5	20.3	**+15.8*** **
95% Confidence Interval	± 0.9	± 0.4	± 4.0
Novice Driver-Casualty-Crashes:			
Adjusted Rate	7.0	6.5	**+8.3***
95% Confidence Interval	± 0.4	± 0.2	± 6.9
Driver-years	18867	60721	
Total Drivers	7950	30682	

[#] *A liable crash is defined as one in which the driver was determined by the claims adjuster to be at least 50% responsible*

[*] *Statistically significant, P<0.05* ***Statistically significant, P<0.0001*

Table 86 provides the age- and gender-specific rates computed by DOC and No DOC submission. The rates for all crashes, Learner crashes, and Novice crashes are provided. As would be expected, much lower crash rates are associated with Learner drivers than Novice drivers – in both the DOC and No DOC groups. Nonetheless ,with the exception of 17-18 year-old male Learner drivers, drivers of all age, gender, and licences stage combinations had higher crash rates if they submitted a DOC than if they did not. Another point of note is that the crash involvement rates for male drivers were consistently higher than the rates for female drivers.

Table 86: Estimated Age- and Gender – Specific GLP Driver Crash Involvement Rates (per 100 Driver-years) – from BIWC

	MALE			FEMALE		
ALL NEW DRIVER CRASHES	**DOC**	**No DOC**	**% Change (± 95% CI)**	**DOC**	**No DOC**	**% Change (± 95% CI)**
Age (in years):						
16	32.6	24.3	+34.1 ± 5.6	24.6	15.8	+55.5 ± 8.3
17 - 18	33.7	24.2	+38.9 ± 18.0	23.6	15.0	+57.8 ± 27.4
19 +	29.7	18.6	+59.1 ± 22.7	18.6	9.8	+89.8 ± 24.4
LEARNER DRIVER CRASHES	**DOC**	**No DOC**	**% Change (± 95% CI)**	**DOC**	**No DOC**	**% Change (± 95% CI)**
Age (in years):						
16	3.6	2.7	+33.2 ± 47.7	3.5	2.0	+72.3 ± 66.5
17 - 18	3.9	4.8	-19.4 ± 87.7	4.4	2.6	+73.7 ± 197.1
19 +	7.9	6.2	+26.6 ± 94.2	4.2	3.3	+28.5 ± 83.1
NOVICE DRIVER CRASHES	**DOC**	**No DOC**	**% Change (± 95% CI)**	**DOC**	**No DOC**	**% Change (± 95% CI)**
Age (in years):						
16	37.0	33.9	+9.0 ± 4.9	28.4	22.7	+24.9 ± 7.3
17 - 18	38.1	34.5	+10.6 ± 11.0	25.9	23.9	+8.3 ± 14.3
19 +	34.8	31.6	+10.2 ± 15.1	22.3	17.9	+24.3 ± 16.1

6.5.2 Effect of the GLP Extended Learner Stage

The majority of drivers (85%) who submitted a DOC obtained a reduction in the minimum length of their Learner stage. To explore the effect of the shorter Learner stage, the crash rates for DOC and No DOC drivers were re-estimated and compared after adjustment for the age, gender, and length of Learner stage (in months) for each driver. The results of these comparisons are shown in Table 87. The results indicate that much, though not all, of the higher cash rate observed for DOC drivers can be explained by the shorter period of time these driver spend in the low-risk, supervised Learner stage.

Table 87: Comparison (% Change) of Crash Involvement Rates (± 95% Confidence Interval) after Adjustment for Age, Gender and Number of Months as a Learner-Driver – All crashes and Liable Crashes

All Crashes	BIWC
All GLP Drivers	DOC 0.9% (± 3.2) lower than No DOC
All GLP Drivers – who successfully completed their Learner stage	DOC 5.6% (± 3.7) higher* than No DOC
Novice Drivers only	DOC 10.3% (± 3.9) higher* than No DOC
Liable Crashes Only	
All GLP Drivers	DOC 5.8% (± 4.5) higher* than No DOC
All GLP Drivers – who successfully completed their Learner stage	DOC 13.3% (± 4.9) higher* than No DOC
Novice Drivers only	DOC 19.0% (± 5.4) higher* than No DOC
Property Damage Only	
All GLP Drivers	DOC 0.1% (± 3.8) higher than No DOC
All GLP Drivers – who successfully completed their Learner stage	DOC 6.9% (± 4.2) higher* than No DOC
Novice Drivers only	DOC 11.4% (± 4.6) higher* than No DOC
Casualty Crashes Only	
All GLP Drivers	DOC 4.3% (± 6.7) lower than No DOC
All GLP Drivers – who successfully completed their Learner stage	DOC 1.7% (± 7.3) higher than No DOC
Novice Drivers only	DOC 6.5% (± 7.9) higher than No DOC

* S*tatistically significant, P<0.05*

First Two Years of Licensure

Figures 9 shows monthly crash rates for drivers during their first two years of licensure. In this graph, the increase in rates observed for the DOC group between 3 and 6 months after first licensure is quite apparent. These are the rates associated with the first drivers to take advantage of the time credit available to the DOC group. For the No DOC group the comparable jump in rates does not begin until after the minimum 6-month period permitted for these drivers.

Figure 9: Age and Gender Adjusted GLP Driver-Crash Rates by Month – GLP Drivers who did and did not submit a Driver Training Course Declaration of Completion

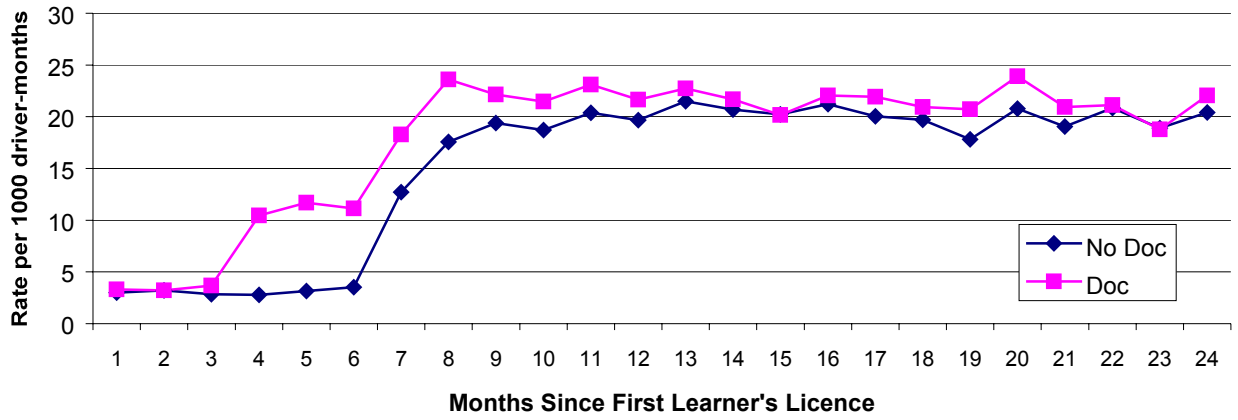


Figure 10 compares the crash rates of drivers during the first two years after obtaining their Novice licence. The higher rates of the DOC group during the first year of Novice licensure is clear, even after adjustment for possible age and gender differences. Whether this is due to differences in driving exposure or other factors could not be explored in this study.

Figure 10: Age and Gender Adjusted Novice Driver-Crash Rates by Month – GLP Drivers who did and did not submit a Driver Training Course Declaration of Completion

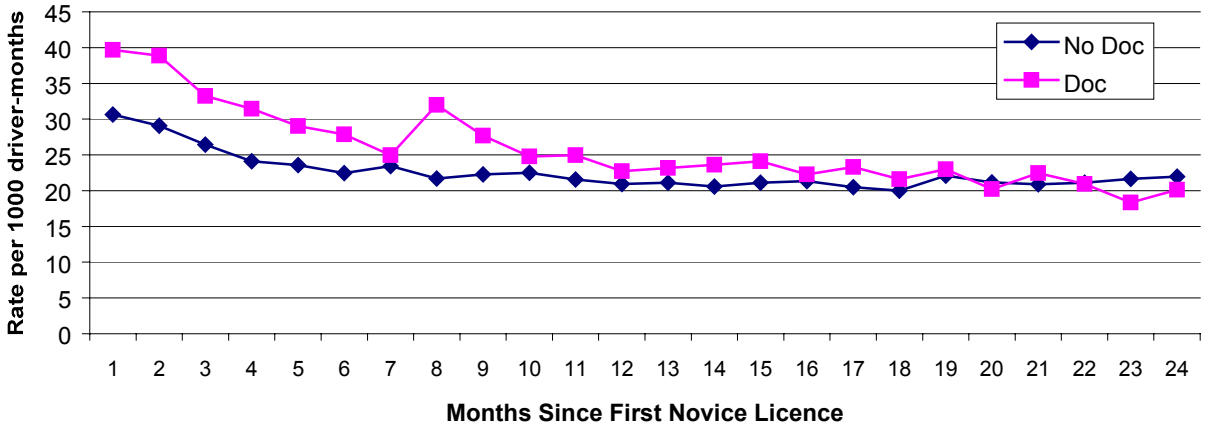


Table 88 shows a comparison of crash rates between the DOC and No DOC drivers, before and after adjustment for the differences between the lengths of their Learner stage. During the first and second years of driving, the estimated crash rates of DOC drivers after adjustment are lower than the rates obtained for the No DOC group. Thus, for overall rate comparisons, the length of the Learner stage has a significant impact on the rate comparisons of the 2 groups. Clearly the shorter learner term of DOC drivers is a major factor contributing to their higher overall rates. For Novice drivers, however, the picture is a little different. During the first year of Novice driving, the crash rates for the DOC group remain higher than the No DOC group, even after adjustment for the length of the Learner stage. Over the first 2 years of Novice driving, the higher rate obtained for the DOC group, after adjustment for the Learner stage, drops considerably. This suggests that as the two groups begin to accumulate experience, and perhaps maturity, their risk of crash involvement becomes more similar.

The estimated percentage differences between the DOC and No DOC groups, after adjustment for time spent in the Learner stage, need to be interpreted with some caution. In the comparisons between the DOC and No DOC groups, the length of the Learner stage is very highly correlated with group membership – to a greater extent even than in the GLP and Pre-GLP group comparisons. The estimated percentage differences may, therefore, should only be considered as indicators of the influence of the amount of Learner time, not as accurate estimates of the magnitude of the change.

Table 88: Comparison (% Change) of GLP Driver Crash Rates During the First Two Years of Driving After Adjustment for Age, Gender and Before and After Adjustment for the Length of the Learner Stage

	% Change in Crash Rate
First Year of Driving– unadjusted for the length of the Learner stage	DOC 149.8% (± 13.4) higher*** than No DOC
First Year of Driving–adjusted for the length of the Learner stage	DOC 23.7% (± 6.0) lower*** than No DOC
First 2 Years of Driving–unadjusted for the length of the Learner stage	DOC 66.5% (± 5.9) higher*** than No DOC
First 2 Years of Driving –adjusted for the length of the Learner stage	DOC 5.9% (± 4.0) lower* than No DOC
First Year as a Novice Driver- unadjusted for length of the Learner stage	DOC 26.4% (± 5.6) higher* than No DOC
First Year as a Novice Driver - adjusted for the length of the Learner stage	DOC 13.6% (± 6.0) higher* than No DOC
First 2 Years as a Novice Driver– unadjusted for the length of the Learner stage	DOC 18.2% (± 4.2) higher* than No DOC
First 2 Years as a Novice Driver - adjusted for the length of the Learner stage	DOC 0.9% (± 5.2) higher than No DOC

* *Statistically significant, P<0.05* ****Statistically significant, P<0.0001*

6.5.3 Summary New Driver Crash Rate Analysis

Significantly higher crash rates were observed in this study for drivers who submitted a DOC compared to those who did not. Age and gender adjusted rates were higher during both the Learner Period, and during the Novice phase. It must be recalled, however, that these findings do not take into account any differences between the two study cohorts with respect to their driving exposure. Drivers who submitted a DOC had significantly shorter Learner periods than those who did not. Although the rates were adjusted for the length of time drivers spent as a Learner, there may well be differences in the crash risks of drivers who progress through the Learner phase faster than other drivers. It is possible also that they did not practice their driving as often as drivers who remained in the Learner phase longer. Or, perhaps the compression of hours of practice and learning into a shorter period of time affects the crash risks of these drivers. Perhaps they have not had sufficient time in a supervised environment to acquire an adequate level of experience and judgement. There could also be a maturation effect among drivers who remain in the Learner period for a longer period of time and this, in combination with the additional experience gained under supervised conditions, could contribute to the lower crash rate observed for the No-DOC group.

The higher crash rate observed for DOC Novice drivers, after adjusting for age, gender, and time spent as a Learner, may also be due to other factors. Novice drivers (and possibly their parents) may believe that the driver training program has made them better, safer drivers than they can reasonably expect to be, given their limited driving experience. As well, it is possible that drivers from the DOC group may drive more than those from the No-DOC group. If so, then the higher crash risks associated with greater driving exposure could translate into a higher crash rate for DOC drivers. Consequently, if adjustment for exposure could be undertaken, the comparison of the rates of the two groups may well be further attenuated, if not reversed. Unfortunately, driving exposure data for the members of the GLP cohort were not available. However, an effort will be made to explore the role of exposure in a study presented in a later section of this report. This study had, as one of its major purposes, the collection of information relating to the differing levels and types of driving exposure experienced by DOC and No-DOC drivers, and the exploration of the relationship of this information to crash involvement.

6.6 Analysis of GLP Driver Violation and Driving Prohibition Rates

In this section, the relationship between the driving behaviours of GLP drivers and their submission of a DOC is examined. Differences between the DOC and No DOC drivers with respect to their violation and prohibition/suspension rates are be explored.

6.6.1 All GLP Drivers

The purpose of this section is to explore whether or not there is any evidence to suggest that DOC drivers drive more, or less, safely than their No DOC counterparts. As noted earlier, due to the limitations of the available data, it will not be possible to ascertain more than simple associations in this report. More detailed work, including the collection of additional data, will be required before statements can be made of a ‘cause-and-effect nature.

As was the case in the comparison of GLP and Pre-GLP drivers, the analysis of driving behaviour will be based on the calculation of violation rates. Driving behaviour-related prohibition rates will also be examined, but this will be primarily for descriptive purposes. There is no reason to expect a different rate of prohibitions or suspensions, unless there is a different rate of violations. The same sanctions and rules applied to both groups of drivers. Prohibitions or suspensions arising due to fitness to drive issues, violations of the Young Offender’s Act,

or as a term or Probation have been excluded. Due to the small number of prohibitions, no sub-categories of driving-related prohibitions/suspensions were analyzed.

Violations were categorized as follows for the analysis of rates: 1) pointed speeding violations, 2) other pointed violations – excluding breaches of licence restrictions, 3) breaches alone, and 4) short-term (12/24 hour) prohibitions.

Table 89: Percentage Change in GLP Driver-Violation and Prohibition Rates (per 100 driver-years)

	Violations / Prohibitions		
	DOC	No DOC	% Change
Pointed Speeding Violations:			
Number	3,842	11,475	
Rate	**17.45**	**11.82**	**+47.6%*** **
95% Confidence Interval	±0.55	±0.22	±5.5
Other Pointed-Violations – excluding breach of licence restrictions:			
Number	1,259	4,709	
Rate	**5.72**	**4.85**	**+17.9%*** **
95% Confidence Interval	±0.32	±0.14	±7.5
Breach of Licence Restrictions:			
Number	2,225	8,521	
Rate	**10.11**	**8.78**	**+15.1%*** **
95% Confidence Interval	±0.42	±0.19	±5.5
12/24 Hour Prohibitions:			
Number	524	2,136	
Rate	**2.38**	**2.20**	**+8.2%**
95% Confidence Interval	±0.20	±0.09	±10.7
Driving-Behaviour Related Prohibitions/Suspension:			
Number	1,662	5,284	
Rate	**7.55**	**5.44**	**+38.7%*** **
95% Confidence Interval	±0.36	±0.15	±7.8
Driver-years	22,012	97,064	
Total Drivers	8,080	37,338	

* *Statistically significant, P<0.0001*

Table 89 shows the results of the initial analysis of violation and prohibition rates for DOC and No DOC New Drivers. Once again, Poisson regression was used to test the significance of the comparison between the rates of the two groups. Drivers for whom age at first Learner's licence and/or gender (N=15) was not available have been excluded from the analyses.

As is shown in Table 89, the DOC group had higher rates of speeding, breach of licence restrictions (most of which are due to GLP restrictions) and other pointed violations than did the No DOC group. Given the link between pointed violations and driving prohibitions it is not surprising that the prohibition/suspension rate was also found to be significantly higher for the DOC group. No significant difference was observed, however, between the 12/24-hour prohibition rates for the two groups.

Table 90: Percentage Change in GLP Driver-Violation and Prohibition Rates (per 100 driver-years) – for Drivers Who Completed the Learner Stage During the Study Period

	Violations / Prohibitions		
	DOC	**No DOC**	**% Change**
Pointed Speeding Violations:			
Number	3,841	11,326	
Rate	**17.64**	**13.28**	**+32.9%*** **
95% Confidence Interval	±0.56	±0.24	±4.9
Other Pointed-Violations – including breach of licence restrictions:			
Number	1,254	4,374	
Rate	**5.76**	**5.13**	**+12.3%** **
95% Confidence Interval	±0.32	±0.15	±7.2
Breaches of Licence Restrictions:			
Number	2,220	7,829	
Rate	**10.20**	**9.18**	**+11.1%*** **
95% Confidence Interval	±0.42	±0.20	5.3
12/24 Hour Prohibitions:			
Number	523	1,992	
Rate	**2.40**	**2.34**	**+2.9%**
95% Confidence Interval	±0.21	±0.10	±10.3
Driving-Behaviour Related Prohibitions/Suspension:			
Number	1,662	5,166	
Rate	**7.63**	**6.06**	**+26.1%*** **
95% Confidence Interval	±0.37	±0.17	±7.1
Driver-years	21,769	85,306	
Total Drivers	7,949	30,682	

*** Statistically significant, P<0.001* *** Statistically significant, P<0.0001*

One factor that affects these rates is that DOC drivers progress through to the Novice stage faster than drivers in the No DOC group; and fewer of the DOC group failed to progress into the Novice stage than did members of the no DOC group (2% and 18 % respectively). To determine the effect of this slower progression, violation and prohibition rates were recalculated and compared for the subset of drivers who became Novice drivers during the study period. These rate comparisons are shown in Table 90.

Clearly, the difference between the violation rates of the two groups has been attenuated by the exclusion of drivers who remained in the Learner stage for the entire study duration. Nonetheless, the DOC rates remained higher than the No DOC rates. Other factors that may be contributing to these higher rates include the age and gender distributions of the two groups as well as the differences in the lengths of their Learner stages.

In the following section, the effects of these factors are explored.

6.6.1.1 New Driver Rates Adjusted for Age and Gender

The following tables show the results of the analyses that were conducted in order to compare rates after adjustment for the potentially confounding effects of age and gender. Table 91 shows the results for all of the DOC and No DOC drivers included in the study. Table 92 shows the results for the drivers, in both groups, who successfully completed the Learner stage during the study period. A comparison of the violation rates shown in Tables 91 and 92 to those in Tables 89 and90 show that adjustment for age and gender has further attenuated the differences between the violation rates of the two groups.

Table 91: Percentage Change in GLP Driver-Violation and Prohibition Rates (per 100 driver-years) – Adjusted for Age at First Learner's Licence and Gender

	Violations / Prohibitions		
	DOC	No DOC	% Change
Pointed Speeding Violations:			
Adjusted Rate	**12.55**	**9.40**	**+33.6%*** **
95% Confidence Interval	±0.47	±0.19	±501
Other Pointed-Violations – including breach of licence restrictions:			
Adjusted Rate	**4.52**	**4.01**	**+12.6%** **
95% Confidence Interval	±0.28	±0.13	±3.2
Breach of Licence Restrictions:			
Adjusted Rate	**7.52**	**6.86**	**+9.6%*** **
95% Confidence Interval	±0.36	±0.16	±5.2
12/24 Hour Prohibitions:			
Adjusted Rate	**1.58**	**1.52**	**+4.0%**
95% Confidence Interval	±0.17	±0.08	±10.4
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**5.19**	**4.05**	**+28.0%*** **
95% Confidence Interval	±0.30	±0.13	±7.3
Driver-years	22,012	97,064	
Total Drivers	8,080	37,338	

*** Statistically significant, P<0.001* *** Statistically significant, P<0.0001*

Table 92: Percentage Change in New Driver-Violation and Prohibition Rates (per 100 driver-years) for Drivers Who Completed the Learner Stage – Adjusted for Age at First Learner's Licence and Gender

	Violations / Prohibitions		
	DOC	No DOC	% Change
Pointed Speeding Violations:			
Adjusted Rate	**14.06**	**11.21**	**+25.4%*** **
95% Confidence Interval	±0.50	±0.22	±4.7
Other Pointed-Violations			
Adjusted Rate	**4.75**	**4.35**	**+9.3%***
95% Confidence Interval	±0.29	±0.14	±7.1
Breaches of Licence Restrictions:			
Adjusted Rate	**7.90**	**7.35**	**+7.4%***
95% Confidence Interval	±0.37	±0.18	±5.2
12/24 Hour Prohibitions:			
Adjusted Rate	**1.66**	**1.65**	**+0.5%**
95% Confidence Interval	±0.17	±0.09	±10.1
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**5.67**	**4.70**	**+20.6%*** **
95% Confidence Interval	±0.32	±0.15	±6.8
Driver-years	21,769	85,306	
Total Drivers	7,949	30,682	

**Statistically significant, P<0.05* ***Statistically significant, P<0.0001*

6.6.2 Learner Drivers

Tables 93 through 96 show the rates and rate comparisons performed for Learner drivers in the DOC and No DOC. In almost all of the violation rate comparisons, Learners in the DOC group had lower violation rates than in the No DOC groups, particularly for breach of licence restriction violations (which would impact the rates of pointed violations). This could indicate a greater tendency on the part of DOC Learners to be more diligent about using their L signs.

Table 93: Percentage Change in Learner Driver Violation and Prohibition Rates (per 100 driver-years)

	Violations / Prohibitions		
	DOC	**No DOC**	**% Change**
Pointed Speeding Violations:			
Number	18	320	
Rate	**0.73**	**1.76**	**-58.4%*** **
95% Confidence Interval	±0.30	±0.14	±19.9
Other Pointed-Violations:			
Number	23	638	
Rate	**0.73**	**1.76**	**-58.4%*** **
95% Confidence Interval	±0.30	±0.14	±19.9
Breaches of Licence Restrictions Only:			
Number	50	1,330	
Rate	**1.59**	**3.66**	**-56.6%*** **
95% Confidence Interval	±0.44	±0.20	±13.5
12/24 Hour Prohibitions:			
Number	9	210	
Rate	**0.29**	**0.58**	**-50.5%***
95% Confidence Interval	±0.19	±0.08	±41.3
Driving-Behaviour Related Prohibitions/Suspension:			
Number	8	360	
Rate	**0.25**	**0.99**	**-74.3%*** **
95% Confidence Interval	±0.18	±0.10	±22.6
Driver-years	3,148	36,343	
Total Drivers	8,080	37,338	

**Statistically significant, P<0.05* ****Statistically significant, P<0.0001*

Table 94: Percentage Change in Learner Driver-Violation and Prohibition Rates (per 100 driver-years) – for Drivers who Completed the Learner Stage during the Study Period

	Violations / Prohibitions		
	DOC	No DOC	% Change
Pointed Speeding Violations:			
Number	17	171	
Rate	**0.59**	**0.70**	**-15.8%**
95% Confidence Interval	±0.28	±0.10	±50.2
Other Pointed-Violations:			
Number	18	303	
Rate	**.62**	**1.23**	**-49.7%***
95% Confidence Interval	±0.29	±0.14	±28.2
Breaches of Licence Restrictions Only:			
Number	45	638	
Rate	**1.55**	**2.59**	**-40.3%****
95% Confidence Interval	±0.45	±0.20	±20.1
12/24 Hour Prohibitions:			
Number	8	66	
Rate	**0.28**	**0.27**	**+2.6%**
95% Confidence Interval	±0.19	±0.06	±98.4
Driving-Behaviour Related Prohibitions/Suspension:			
Number	8	242	
Rate	**0.28**	**0.98**	**-72.0%****
95% Confidence Interval	±0.19	±0.12	±24.8
Driver-years	2,904	24,584	
Total Drivers	7,949	30,682	

**Statistically significant, P<0.05* ***Statistically significant, P<0.001*

Table 95: Percentage Change in Learner Driver-Violation and Prohibition Rates (per 100 driver-years) – Adjusted for Age at First Learner's Licence and Gender

	Violations / Prohibitions		
	DOC	No DOC	% Change
Pointed Speeding Violations:			
Adjusted Rate	**0.40**	**0.52**	**-22.6%**
95% Confidence Interval	±0.22	±0.07	±43.6
All Pointed-Violations:			
Adjusted Rate	**0.52**	**1.04**	**-49.5%***
95% Confidence Interval	±0.25	±0.10	±24.3
Breaches of Licence Restrictions Only:			
Adjusted Rate	**1.14**	**2.18**	**-47.8%*** **
95% Confidence Interval	±0.37	±0.15	±16.3
12/24 Hour Prohibitions:			
Adjusted Rate	**0.17**	**0.27**	**-37.1%**
95% Confidence Interval	±0.15	±0.05	±52.8
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**0.18**	**0.57**	**-68.9%***
95% Confidence Interval	±0.15	±0.08	±27.5
Driver-years	3,148	36,343	
Total Drivers	8,080	37,338	

Statistically significant, P<0.05 ***Statistically significant, P<0.0001*

Table 96: Percentage Change in Learner Age- and Gender-adjusted Learner Driver-Violation and Prohibition Rates (per 100 driver-years) - For Drivers who Completed the Learner Stage

	Violations / Prohibitions		
	DOC	No DOC	% Change
Pointed Speeding Violations:			
Adjusted Rate	**0.43**	**0.46**	**-5.6%**
95% Confidence Interval	±0.24	±0.08	±56.6
Other Pointed-Violations:			
Adjusted Rate	**0.46**	**0.80**	**-43.1%***
95% Confidence Interval	±0.25	±0.11	±32.0
Breaches of Licence Restrictions Only:			
Adjusted Rate	**1.18**	**1.78**	**-33.7%***
95% Confidence Interval	±0.40	±0.17	±22.4
12/24 Hour Prohibitions:			
Adjusted Rate	**0.19**	**0.16**	**+15.7%**
95% Confidence Interval	±0.16	±0.05	±111.9
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**0.19**	**0.59**	**-67.4%***
95% Confidence Interval	±0.16	±0.10	±29.0
Driver-years	2,904	24,584	
Total Drivers	7,949	30,682	

**Statistically significant, P<0.05*

6.6.3 Novice Drivers

Tables 97 and 98 show the rate calculations and group comparisons for Novice driver violations and prohibitions. After adjustment for age and gender, few significant differences were found between the DOC and No DOC Novice drivers, with respect to their violation rates. As with Learner drivers who submitted a DOC, however, DOC Novice drivers also had a lower breach of licence restriction rate.

Table 97: Percentage Change in Novice Driver-Violation and Prohibition Rates (per 100 driver-years)

	Violations / Prohibitions		
	DOC	**No DOC**	**% Change**
Pointed Speeding Violations:			
Number	3,824	11,155	
Rate	**20.27**	**18.37**	**+10.3%*** **
95% Confidence Interval	±0.64	±0.34	±4.1
Other Pointed-Violations:			
Number	1,237	4,071	
Rate	**6.56**	**6.70**	**-2.2%**
95% Confidence Interval	±0.37	±0.21	±6.4
Breaches of Licence Restrictions Only:			
Number	2,175	7,191	
Rate	**11.53**	**11.84**	**-2.7%**
95% Confidence Interval	±0.48	±0.27	±4.8
12/24 Hour Prohibitions:			
Number	515	1,926	
Rate	**2.73**	**3.17**	**-13.9***
95% Confidence Interval	±0.24	±0.14	±8.7
Driving-Behaviour Related Prohibitions/Suspension:			
Number	1,654	4,924	
Rate	**8.77**	**8.11**	**+8.1***
95% Confidence Interval	±0.42	±0.23	±6.2
Driver-years	18,867	60,721	
Total Drivers	7,950	30,682	

**Statistically significant, P<0.05* ****Statistically significant, P<0.0001*

Table 98: Percentage Change in Novice Driver-Violation and Prohibition Rates (per 100 driver-years) – Adjusted for Age at First Novice Licence and Gender

	Violations / Prohibitions		
	DOC	No DOC	% Change
Pointed Speeding Violations:			
Adjusted Rate	**15.8**	**15.33**	**+3.1%**
95% Confidence Interval	±0.57	±0.31	±3.9
Other Pointed-Violations:			
Adjusted Rate	**5.41**	**5.65**	**-4.3%**
95% Confidence Interval	±0.33	±0.19	±6.3
Breaches of Licence Restrictions Only:			
Adjusted Rate	**8.88**	**9.34**	**-4.9%***
95% Confidence Interval	±0.43	±0.24	±4.7
12/24 Hour Prohibitions:			
Adjusted Rate	**1.97**	**2.24**	**-11.9%***
95% Confidence Interval	±0.20	±0.12	±9.0
Driving-Behaviour Related Prohibitions/Suspension:			
Adjusted Rate	**6.25**	**6.15**	**+1.7%**
95% Confidence Interval	±0.36	±0.20	±5.9
Driver-years	18,867	60,721	
Total Drivers	7,950	30,682	

**Statistically significant, P<0.05*

6.6.4 Effect of the Extended Learner Stage

Table 99 shows the results of adjusting the violation and prohibition rates of all GLP drivers novice drivers only, after adjustment for age, gender, and the length of the Learner stage. After adjustment for all of the factors, DOC drivers were consistently found to have estimated rates that were significantly lower than those of the drivers in the No DOC group. As was seen in the comparison of crash rates, the shorter learner period associated with the DOC group has had a significant confounding effect on violation and prohibition rates. Once again, however, because of the high correlation between group membership and the length of the Learner stage, the estimated amount of change is indicative only of the impact of the time discount to the DOC group, and should not be interpreted as a precise estimate of the magnitude of the change.

Table 99: Comparison (% Change) of Violations Rates (± 95% CI) after Adjustment for Age at First Learner's, Gender, and Number of Months as a Learner-Driver

Pointed Speeding Violations	Percentage Change
All New Drivers	DOC – 16.3% (± 3.6) lower than No DOC group***
All New Drivers – who successfully completed their Learner stage	DOC – 11.0% (± 3.9) lower than No DOC group***
Novice Drivers only	DOC – 5.4% (± 4.2) lower than No DOC group**
Other Pointed Violations	**Percentage Change**
All New Drivers	DOC – 15.7% (± 5.9) lower than No DOC group***
All New Drivers – who successfully completed their Learner stage	DOC – 12.2% (± 6.5) lower than No DOC group **
Novice Drivers only	DOC – 9.0% (± 7.1) lower than No DOC group*
Breaches of Licence Restrictions Only	**Percentage Change**
All New Drivers	DOC – 17.4% (± 4.4) lower than No DOC group ***
All New Drivers – who successfully completed their Learner stage	DOC – 16.4% (± 4.6) lower than No DOC group *
Novice Drivers only	DOC – 16.6% (± 4.8) lower than No DOC group ***
12/24-Hour Prohibitions Only	**Percentage Change**
All New Drivers	DOC – 22.6% (± 8.4) lower than No DOC group ***
All New Drivers – who successfully completed their Learner stage	DOC – 16.9% (± 9.5) lower than No DOC group **
Novice Drivers only	DOC – 13.4% (± 10.2) lower than No DOC group *
Driving Behaviour-Related Prohibitions /Suspensions	**Percentage Change**
All New Drivers	DOC – 24.5% (± 4.9) lower than No DOC group ***
All New Drivers – who successfully completed their Learner stage	DOC – 23.6% (± 5.2) lower than No DOC group ***
Novice Drivers only	DOC – 23.4% (± 5.4) lower than No DOC group ***

**Statistically significant, P<0.05* ***Statistically significant, P<0.001* ****Statistically significant, P<0.0001*

6.6.5 Summary

It should be noted that, because the approved driver education program was not widely available until January 1999, a number of drivers who entered GLP in the early months after its implementation were not able to access the approved course. Also, the formative evaluation of the driver education program that was done in October 2000 found a number of inconsistencies in the application of program standards (Appendix B). Consequently, it is not possible to ascertain in this study to what extent any differences between the crash or violation rates observed for drivers who did or did not submit a DOC may be due to less than optimal implementation of the GLP-approved course.

It is also not possible, on the basis of this study, to estimate the amount or the type of driving undertaken by GLP drivers who did or did not submit a DOC. As noted earlier, drivers who participate in driver education may drive more or under more risky conditions than drivers who do not participate in driver education. If so, then it is possible that the differences observed in this study may be the result of different levels or amounts of risk exposure. For the Year 2 evaluation, a preliminary study was undertaken in an attempt to begin examining the issue of exposure. The results were mixed, however, and a more thorough investigation was determined to be required before any comprehensive statements could be made about relationships between driver training, driving exposure, and new driver crashes. The next section of this report describes the results of a study undertaken, as part of this evaluation, to investigate these relationships.

On the basis of the study described in this section, however, the shorter learner period made available to individuals who completed an ICBC-approved drivers education course, and submitted a DOC to ICBC, has been identified as problematic. By adjusting for differences in the Learner stages an attenuating effect was observed on the higher crash rates observed for the DOC group. This suggests that one of the major factors underlying the higher rates is the offering of a time credit. This result is likely due to mostly to a combination of differences in driving exposure, maturity, and lack of experience. It may also be a result of compressing the learning process into too short a period of time. If so, an extension of the Learner stage may reduce the impact of this incentive.

Although the shorter Learner stage is clearly an important factor in the higher crash rates of drivers in the DOC group, it is not the only factor. After adjusting for the length of the Learner stage, Novice drivers in the DOC group were still found to have a higher crash rate than drivers in the No DOC group. Several factors may contribute to this finding, including differences in driving exposure once the driver leaves the Learner stage, and differences in vehicle access and driver attitudes. The next section describes a study undertaken to investigate relationships between such factors, crash involvement, and participation in driver education.

Section 7. Driver Education and Exposure

One of the primary findings of Chapter 6 was that drivers who took the ICBC-approved driver education course and submitted a DOC had a higher crash rate than drivers who did not submit a DOC. In Canada, similar findings have been reported in evaluations of the Ontario (Boase & Tasca, 1998) and Nova Scotia (Mayhew, et. al., 2002) graduated licensing systems. In fact, typically, evaluations that have examined the relationship between driver education and crash risks have been unable to demonstrate a positive safety benefit (in terms of crash rate reduction) for driver education, whether associated with a graduated licensing program or not (Mayhew & Simpson, 1996; 2002).

Several explanations have been sought for this somewhat counterintuitive result. Some of the factors that may differentiate between those who do and don't take driver education include: age, gender, motivation, life style, socio-economic factors, and attitude. However, driving exposure – or the amount and type of driving undertaken – has most often been raised as a likely explanatory factor. If drivers who take a driver education course, particularly those who take it to reduce the length of time they spend in the Learner stage, drive more or under more risky conditions than those who do not take such courses, then it is to be expected that they would have a higher crash rate. Unfortunately, due the difficulties associated with obtaining driving exposure data this question has not yet been answered. However, it is important to try to answer this question because the type of answer obtained will suggest different strategies for dealing with the problem.

Exposure issues can be addressed by reducing the amount or type of driving in which new drivers engage. Graduated licensing programs have done this, to a large extent, by increasing the length of the Learner (supervised) stage. Some jurisdictions have also reduced exposure to certain types of driving when drivers reach the Novice stage (i.e., no driving on certain highways, no night driving, no driving unsupervised with passengers in the vehicle). But, perhaps more needs to be done – particularly during the first few months of solo driving when drivers are at their most vulnerable.

If, however, the higher crash rate observed for those who take driver education cannot be attributed to the amount or type of driving, then perhaps it is something about the way in which the education course content, or the way it is delivered that is not appropriate. If so, then curriculum changes may provide a solution. Alternatively, if it's characteristics of the drivers themselves – their age, level of maturation, motivation, or attitude a very different set of strategies will be required.

The present study was undertaken specifically to examine the effect of driving exposure on the crash to driver education relationship. If the difference in crash rates of those who do and those who do not participate in driver is due to exposure then the higher rate should disappear once exposure has been taken into account. If it does not then other explanations will have to be sought.

The primary objective of this study is to determine if the odds of a crash for drivers who took an ICBC-approved driver education course is higher (or lower) than the odds of a crash for drivers who did not take an approved course, after adjustment for level of driving exposure.

A number of other factors may also differentiate between those who participate in driver education and those who do not, as well as between those who have a high risk of crash involvement and those who do not. The role of these factors will also be explored. They include the driver's age, gender, and attitudes towards driving. Socio-economic status may also be a factor. Driver education courses, particularly comprehensive courses such

as the ICBC-approved course, are costly. Consequently, self-selection based on affordability, or willingness to pay, may be an issue.

7.1 Method

To meet the objectives of this study a case-control design was used. For a case-control study, the sample is selected based on the presence or absence of a particular condition or set of conditions. For present purposes, drivers were selected on the basis of whether or not they had been involved in a crash, particularly a liable crash, during the first 6 months of Novice driving (i.e., after obtaining their Novice licence).

7.1.1 Sample Selection Criteria

The specific sample selection criteria for the case-control study were defined as follows:

Eligibility: All individuals who had obtained a first Learner's licence in the GLP program and had graduated to the Novice stage at least 6 months (180 days) prior to August 31, 2003. Drivers with out of province driving experience were excluded from the study.

Definition of Cases: From the eligible new driver population, two groups of cases were defined: 1) drivers involved in a "liable" crash during their first six months of Novice driving, and 2) drivers involved in a not-liable" crash during their first six months of Novice driving. Crash involvement was determined on the basis of claims reports made to ICBC. A "liable" crash was one in which the driver was determined, by a claims adjuster, to be 50% or more responsible for the crash.

Definition of Controls: The controls for the study were defined as drivers with no crash involvement during their first six months of Novice driving. Once again, crash involvement was determined on the basis of claims reports made to ICBC.

Selection Process: The drivers included in the study sample were selected from the eligible populations of drivers in the ICBC driver licensing system who had or had not been involved in one or more crashes during the period of interest. using a stratified random sampling procedure. A total of 4000 drivers were to be selected for inclusion in the study: 2,000 from the population of drivers for whom no crashes had been reported during their first six months of unsupervised driving, 1400 drivers from the population of those who had been involved in at least one liable crash, and 600 from the population of those who had only been involved in a non-liable crash or crashes. These numbers were selected in order to reflect the relative proportion of 'liable' and 'non-liable' crashes in the crash-involved population. Quota sampling methods were used to ensure that the drivers included in the samples were representative of the population of new drivers by age, gender, and the region in which they resided when their Novice licence was issued. For sampling purposes, the Province was divided into two regions – the south west (Lower Mainland, Vancouver Island, and the Fraser Valley) and the rest of the Province (South Central Interior and Northern Interior).

7.1.2 Data Sources

All of the driver, crash and contravention data used in this study were extracted from the Business Information Warehouse Claims data(BIWC). At the time of the extraction the data were current as of August 31, 2003.

The driving exposure and driver training information needed for the study were obtained from a **New Driver Telephone Survey** conducted in November 2003. CGT International, an independent Research Firm, was contracted by ICBC to conduct the survey. The GLP Project team at ICBC, with input from CGT consultants,

developed the questionnaire used in the survey. A copy of the questionnaire is included in Appendix D. The questionnaire was offered in three languages: English, Punjabi, and Chinese (Cantonese and Mandarin dialects).

7.1.3 Study Samples

As stated above, it was intended that 4,000 GLP drivers would be selected for inclusion in this study – 2,000 who had been involved in a crash during the first six months after obtaining their Novice licence, and 2,000 who had not. A total of 106,446 new drivers were included in the call sample provided to the survey house. To obtain phone numbers for each of these new drivers a multistage process was used. For the majority of new drivers (76.3%) a phone number was available in the ICBC data files. Generally, new drivers who had a phone number in the system had come into contact with ICBC for some reason – usually an insurance claim. Consequently, a process was initiated to match new drivers to an individual with the same last name living at the same address, so that new drivers who had had no contact with ICBC could be included in the sample. The phone numbers for the remaining 23.7% of the call sample were obtained in this manner. The call samples were provided in separate batches to the survey house so that they could ensure that a representative proportion of the completed surveys were conducted from both groups.

One other issue that arose in generating the samples for the survey was one of timing. The primary intent of the survey was to assess the amount and type of driving undertaken during the first six months of Novice driving. The call sample, however, included all drivers who had ***at least*** six months of Novice driving. Consequently, many of the drivers in the call sample could have held their Novice licence for much longer than six months. In an effort to keep the timing of the telephone interview as close to the six month period of interest as possible, the survey house was instructed to order the list of drivers by the date on which they obtained their Novice licence. Calls were then made from the most recently licensed drivers to those who had been licensed for a longer period of time.

A total of 21,779 new drivers were actually called during the conduct of the survey. Of these, 8,022 of the calls were found to be either wrong numbers, not in service numbers, fax/modem numbers, or no answers/busy signals. A further 3,179 calls were to individuals who agreed to a call back but who were unable to be included in the survey prior to the end of the study period, 2, 574 were to individuals who were not available at all during the study period, and 1,791 were to individuals who did not meet the inclusion criteria for the study. Of the final list of 6,213 drivers who both qualified and were available for the study, 4,181 (67.3%) completed the interview.

Detailed tables containing the responses to all survey items, tabulated by crash and driver education group, are provided in Appendix E.

Table 100 shows the distribution of the final sample by crash group, age, and gender.

Table 100. Distribution of Survey Sample by Age, Gender and Crash Involvement Group

Age	Crash Group								Total	
	Crash				No Crash					
	Male		Female		Male		Female			
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
16 Years	309	28.5	215	23.3	260	24.3	223	20.2	1007	24.1
17 Years	459	42.3	393	42.7	516	48.3	503	45.5	1871	44.8
18 Years	147	13.5	123	13.4	146	13.7	152	13.7	568	13.6
19+ Years	171	15.7	190	20.6	146	13.7	228	20.6	735	17.6
Total	**1,086**	**100.0**	**921**	**100.0**	**1,068**	**100.0**	**1,106**	**100.0**	**4,181**	**100.0**

7.1.4 Statistical Analysis

The primary methods of analysis used in this study were Chi Square tests of association and logistic regression. Logistic regression is appropriate for analyses in which the dependent or outcome variable is dichotomous (i.e., Crash or No Crash). Logistic regression can be used to test associations between one or more potential risk factors and the dichotomous outcome variable. The measure used to evaluate the strength of the associations is the odds ratio. Likelihood ratio statistics were used to compute 95% confidence intervals for the estimated odds ratios.

7.2 Preliminary Analysis of relationship between Driver Training and Crash Involvement

Table 101 shows the association between crash involvement and submission of a DOC. The odds ratio of 1.38 indicates that the odds of a crash for drivers who submitted a DOC were 38% higher than for those who did not submit a DOC.

Table 101. Association between DOC Submission and Crash Involvement

DOC Submitted	Crash Involvement				Odds Ratio (95% confidence Interval)
	Crash		No Crash		
	N	%	N	%	
Yes	685	34.1	592	27.2	1.38*
No	1,322	65.9	1,582	72.8	(1.21 – 1.58)
TOTAL	2,007	100.0	2,174	100.0	

**Statistically significant (P<0.0001)*

Table 102 shows the relationship between DOC Submission and the involvement of new drivers in liable crashes. The results indicate that the odds of a new driver being involved in a liable crash were 48% higher for those who submitted a DOC than for those who did not. Thus, the association between DOC submission and crash involvement is somewhat stronger for liable crashes than for all crashes.

These results are consistent with those obtained in the cohort study that was described in Chapter 6. Thus, despite the difference in method and sample, the association reported previously between DOC submission and crash involvement is observed again here.

Table 102. Association between DOC Submission and Liable Crash Involvement

DOC Submitted	Crash Involvement				Odds Ratio (95% confidence Interval)
	Crash		No Crash		
	N	%	N	%	
Yes	500	35.6	592	27.2	1.48*
No	905	64.4	1,582	72.8	(1.28 – 1.71)
TOTAL	1,405	100.0	2,174	100.0	

**Statistically significant (P<0.0001)*

However, as was also noted previously, drivers who submitted a DOC were eligible to receive up to a 3-month reduction in the length of their Learner stage. Table 103 shows the relationship between DOC submission and crash involvement for drivers who submitted a DOC and received a time credit of at least 10 days or more and drivers who submitted a DOC but received no time credit. Drivers who did not submit a DOC are used as the reference category for the computation of odds ratios. Only a small percentage (less than 5%) of the drivers in this sample who submitted a DOC did not receive a time credit.

Table 103. Association between DOC Submission with Time Credit and total Crash Involvement -

DOC Submitted	Crash Involvement				Odds Ratio (95% confidence Interval)
	Crash		No Crash		
	N	%	N	%	
Yes – with a time credit	588	29.3	509	23.4	1.38* (1.20 – 1.59)
Yes – but no time credit	97	4.8	83	3.8	1.40** (1.03 – 1.89)
No Doc (reference)	1,322	65.9	1,582	72.8	1.00
TOTAL	2,007	100.0	2,174	100.0	

Statistically significant (P<0.0001)* * Statistically significant (P<0.03)*

The results presented in Tables 103 and 104 indicate that, for new drivers who submitted a DOC, the odds of a crash involvement during the first six months of Novice driving were about the same, relative to drivers who did not submit a DOC, whether or not the driver took advantage of the time credit. As with the results presented in

Tables 101 and 102, the relative odds of a liable crash involvement was about 10% higher than the relative odds of any crash involvement, for both groups of drivers who submitted a DOC.

Table 104. Association between DOC Submission with Time Credit and Liable Crash Involvement

DOC Submitted	Crash Involvement				Odds Ratio (95% confidence Interval)
	Crash		No Crash		
	N	%	N	%	
Yes – with a time credit	429	30.5	509	23.4	1.47* (1.27 – 1.72)
Yes – but no time credit	71	5.1	83	3.8	1.50** (1.08 – 2.07)
No DOC (reference)	905	64.4	1,582	72.8	1.00
TOTAL	1,405	100.00	2,174	100.0	

Statistically significant (P<0.0001)* * Statistically significant (P<0.02)*

7.3 Analysis of Driver Education Participation

One of the difficulties associated with the information that is captured in the ICBC administrative data bases is the lack of detailed information on the types and amounts of driver education engaged in by new drivers. All that is captured is whether or not the driver submitted a DOC. And most, if not all, of the drivers who submit a DOC do so because they want to apply for a reduction in the length of their learner stage. Most would receive at least some reduction. Others might not if they were unable to pass the road test in time.

However, there may be other drivers who take driver education, including an ICBC-approved course, but don't submit a DOC. None of this information is captured. Thus, one of the reasons for conducting the telephone survey, was to obtain information on the extent to which new drivers rely on driver education as their preferred method of learning how to drive, and what types of driver education they choose and why.

One of the questions on the survey asked "Who was most responsible for teaching you to drive?" Table 105 shows the responses obtained by Crash Group. Table 106 shows the responses obtained by DOC submission.

Table 105. Survey Responses to the Question "Who was most responsible for teaching you to drive?" – by Crash Involvement

Response	Crash Involvement			
	Crash		No Crash	
	N	%	N	%
A family Member	1,107	55.2	1,231	56.6
A Driver Training School	777	38.7	582	37.7
A private driving instructor	51	2.6	304	3.1
A friend	43	2.1	35	1.6
Other	27	1.3	18	0.8
Don't know/Refused	2	0.1	4	0.2
TOTAL	2,007	100.0	2,174	100.0

Clearly, there is little difference between the two crash groups in the answers given by the respondents (Table 105). However, as would be expected, a much higher percentage of drivers who submitted a DOC (67%) than who did not (29%) indicated that driver education (either through a school or private instructor) was primarily responsible for teaching them to drive (Table 106).

Table 106. Survey Responses to the Question "Who was most responsible for teaching you to drive?" – by DOC Submission

Response	DOC Submitted			
	Yes		No	
	N	%	N	%
A family Member	390	30.5	1.948	67.0
A Driver Training School	842	65.9	754	26.0
A private driving instructor	23	1.8	95	3.3
A friend	9	0.7	69	2.4
Other	12	1.0	33	1.1
Don't know/Refused	1	0.1	5	0.2
TOTAL	1,277	100.0	2,904	100.0

In addition to finding out who respondents felt was primarily responsible for teaching them how to drive, questions from the survey were used to identify who had taken *any* lessons from a driver training school, and whether or not they had taken a complete ICBC-approved driver education course. Responses to these questions were then combined with information recorded in ICBC databases to develop a categorization of the driver education experience of the survey respondents. Table 107 shows the distribution of the results of this categorization process by Crash group, and Table 108 shows the distribution according to whether or not a DOC was submitted to ICBC. For present purposes, respondents who said they had taken lessons from a private instructor, but no lessons from a driving school, were considered to have had no formal driver education. Often the private instructors referred to by the survey respondents were not professional driving instructors.

Table 107. Participation in Driver Education – by Crash Involvement

Category	Crash Involvement			
	Crash		No Crash	
	N	%	N	%
ICBC-Approved Driver Education – with time credit	588	29.3	509	23.4
ICBC-Approved Driver Education –no time credit	259	12.9	252	11.6
Driver Education – Not an ICBC Approved Course	607	30.2	791	36.38
No Driver Education	553	27.6	622	28.6
TOTAL	2,007	100.0	2,174	100.0

As shown in Table 107, about the same percentage (28%) of drivers from both crash groups did not participate in formal driver education. However, a higher percentage of drivers in the Crash group completed the ICBC course and received a time credit than did those in the No Crash group. The association between the type of driver education taken and crash involvement was statistically significant ($P<0.0001$). This relationship between driver education and crash involvement will be explored more fully in a later section of this report.

As would be expected, the majority of respondents who submitted a DOC did receive a time credit (Table 108). However, a substantial percentage (11%) of respondents said they had completed the ICBC – approved driver education course even though no DOC had been submitted to ICBC. And, almost half (48%) of the respondents who did not submit a DOC to ICBC reported having taken at least some training from a formal driving school. These findings suggest that reliance upon DOC submission as an indicator of whether or not drivers have participated in driver education is problematic. At best, DOC submission may serve only as an indicator of whether or not an ICBC-approved driver education course was taken. And, it may actually be suitable only as an indicator of drivers who take the course in order to obtain a time credit.

Table 108. Participation in Driver Education – by DOC Submission

Category	DOC Submitted			
	Yes		No	
	N	%	N	%
ICBC-Approved Driver Education – with time credit	1,097	85.9	0	0.0
ICBC-Approved Driver Education –no time credit	180	14.1	331	11.4
Driver Education – Not an ICBC Approved Course	0	0.0	1,398	48.1
No Driver Education	0	0.0	1,175	40.5
TOTAL	1,277	100.0	2,904	100.0

To obtain a better understanding of what factors contributed to drivers' participation or non-participation in driver education, all of the respondents were asked what their main reason was for attending, or not attending, a driving school. The top few responses, for those who did attend a driving school, broken down by DOC group, have been categorized and are presented in Tables 109. A more detailed list of responses is provided in Appendix E (Novice Survey Tables). A total of 3,006 respondents indicated they had attended a driving school.

Table 109. Reasons for Attending Driving School – by DOC Submission

Category	DOC Submitted			
	Yes		No	
	N	%	N	%
So I could get my licence sooner	443	34.7	83	4.8
To make me a better / safer driver	313	24.5	531	30.7
My parents made me / signed me up	233	18.2	227	13.1
To avoid being taught by parents or learning someone else's bad habits	66	5.2	151	8.7
To prepare me for the road test	54	4.2	402	23.3
Other	148	11.6	324	18.7
Don't know/ No response	20	1.6	11	0.7
RESPONDENTS WHO ATTENDED DRIVING SCHOOL	1,277	100.0	1,729	100.0

A much higher percentage (35%) of the respondents who had submitted a DOC than those who hadn't (5%) cited getting their licence sooner as their primary reason for attending driving school. Respondents who did not submit a DOC were more likely than those who did to cite wanting to become a better /safer driver or preparation for the road test as their primary reasons for attending driving school.

A total of 1,175 (28%) of the survey participants said they did not attend driving school. The reasons given by these respondents are provided in Table 110.

Table 110. Reasons for Not Attending Driving School

Category		
	N	%
Too expensive	705	60.0
Not necessary – others can teach me	222	18.9
Couldn't fit the classes into my schedule	30	2.6
No driving school where I live	18	1.5
Other	174	14.8
Don't know/ No response	26	2.2
RESPONDENTS WHO DID NOT ATTEND DRIVING SCHOOL	1,175	100.0

Clearly, the cost of driving school training is seen as an obstacle for most of the respondents who did not attend a driving school. Whether it is because they truly feel they can't afford to pay or just don't value it enough to be willing to pay was not explored in this study.

Respondents who said they had attended a driving school were next asked if they had taken the complete ICBC-approved driver education course. Those who said yes were asked to indicate the main reason why they chose the approved course. Those who said no were asked to indicate the main reason why they chose not to take the approved course. A total of 1,608 of the respondents either said they had taken the approved course (n=1,497) or

ICBC records showed that they had submitted a DOC (n=111). Table 111 presents the top few responses given by all of these 1,608 individuals, broken down by DOC submission.

As would be expected, a higher percentage of respondents who took the approved course and submitted a DOC (39%) than those who took the course but did not submit a DOC (23%) indicated they took the approved course in order to get their Novice licence more quickly.

Table 111. Reasons for Taking the ICBC-Approved Driver Education Course – by DOC Submission

Category	DOC Submitted			
	Yes		No	
	N	%	N	%
So I could get my licence sooner	499	39.1	77	23.3
To make me a better / safer driver	168	13.2	61	18.4
My parents made me / signed me up	169	13.2	59	17.8
Good reputation/recommended by family or friend	77	6.0	26	7.9
To avoid being taught by parents or learning someone else's bad habits	24	1.9	14	4.2
So that I could get credits for school	22	1.7	8	2.4
To prepare me for the road test	4	0.3	3	0.9
Other	149	11.7	69	20.8
Don't know/ No response	165	12.9	14	4.3
RESPONDENTS WHO TOOK THE APPROVED COURSE	1,277	100.0	331	100.0

Also of interest, was the motivation of those who took driver education but did not receive a time credit, and whether this motivation differed from that of drivers who submitted a DOC and received a time credit. Interestingly, of the 180 drivers who submitted a DOC but did not receive a time credit (Table 112) the distribution of responses was more similar to those who took the course and did not submit a DOC (Table 111) than it was to those who took the course and submitted a DOC for time credit (Table 112). This seems to indicate that although this group did submit a DOC– which suggests they may have wanted a time credit – they may not have been as motivated by the time factor as those who actually received a time credit. It will be interesting to determine to what extent drivers in this group may have had difficulty passing their first road test. This will be explored in a future study.

Table 113 provides the reasons cited for not taking the ICBC-approved course by respondents who did attend a driving school. As with the earlier reasons given by drivers who did not attend a driving school at all, the most frequently cited reason for not taking the approved course, by those who did attend a driving school, was that the course was too expensive. The other primary reasons included not feeling that such a comprehensive course was necessary, and not being in a hurry to obtain a Novice licence.

Table 112. Reasons for Taking the ICBC-Approved Driver Education Course – by DOC Submission and whether or not a Time Credit was Received

Category	DOC Submitted					
	Yes				No	
	Time Credit		No Time Credit			
	N	%	N	%	N	%
So I could get my licence sooner	452	41.2	47	26.1	77	23.3
To make me a better / safer driver	139	12.7	29	16.1	61	18.4
My parents made me / signed me up	140	12.8	29	16.1	59	17.8
Good reputation/recommended by family or friend	68	6.2	9	5.0	26	7.9
To avoid being taught by parents or learning someone else's bad habits	20	1.8	4	2.2	14	4.2
So that I could get credits for school	17	1.5	5	2.8	8	2.4
To prepare me for the road test	0	0.0	4	2.2	3	0.9
Other	126	11.5	23	12.8	69	20.8
Don't know/ No response	135	12.3	30	16.7	14	4.3
RESPONDENTS WHO TOOK THE APPROVED COURSE	1,097	100.0	180	100.0	331	100.0

Table 113. Reasons for Not taking the ICBC-Approved Driver Education Course

Category		
	N	%
Too expensive	762	54.5
Didn't need such a big comprehensive course	182	13.0
Not in a hurry to get my Novice licence	112	8.0
Never heard of it	93	6.7
Couldn't fit the classes into my schedule	43	3.1
Other	71	5.1
Don't know/ No response	135	9.6
RESPONDENTS WHO DID NOT TAKE THE APPROVED COURSE	1,398	100.0

Drivers who attended a driving school were also asked to indicate how much of their driving school instruction time was spent in the classroom and how much instructional time was spent in a vehicle. Drivers who completed the ICBC-approved course were expected to have a minimum of 16 hours in classroom instruction and a minimum of 12 hours in vehicle instruction. Table 114 provides the breakdown of classroom hours by the type of driver training received, and Table 115 provides the breakdown of in-vehicle hours. The data presented in these tables indicate that about half (49%) of the drivers classified as having taken the ICBC-approved course

said they had received at least 16 hours of classroom instruction, and the majority (69%) indicated they had taken at least the minimum of 12 hours of in-vehicle instruction. In contrast, most (84%) of the drivers who did not take the approved course said they had received no hours of classroom instruction, and only 29% said they had received at least 12 hours of in-vehicle instruction.

Table 114. Number of Hours Spent in Classroom Instruction for Drivers who Attended a Driving School

Hours of Classroom Instruction	Type of Training			
	ICBC-Approved Course		Other	
	N	%	N	%
None	88	5.5	1,180	84.4
>0 but <16	419	26.1	138	9.9
16 to 30	653	40.6	24	1.7
More than 30	142	8.8	7	0.5
Don't know/ No Response	306	19.0	49	3.5
TOTAL	1,608	100.0	1,398	100.0

Table 115. Number of Hours of In-Vehicle Instruction for Drivers who attended a Driving School

Hours of In-Vehicle	Type of Training			
	ICBC-Approved Course		Other	
	N	%	N	%
None	4	0.2	10	0.7
1-11	210	13.1	882	63.1
12-29	628	39.1	247	17.7
More than 30	484	30.1	160	11.4
Don't know/ No Response	282	17.5	99	7.1
TOTAL	1,608	100.0	1,398	100.0

It should be noted that a substantial percentage of drivers who took an approved course did not report receiving the minimum number of classroom or in-vehicle hours (31% and 13%, respectively). These responses could indicate either recall difficulties on the part of the respondent, or courses that were not meeting the minimum standards on these requirements. It is not possible, based on the present study, to ascertain which is the case. A specific evaluation of the ICBC-approved driver education course would be required in order to determine to what extent standards are being met. However, some preliminary information provided by the Driver Training and Assessment Standard department at ICBC permitted a comparison of the drivers' responses with schools based on a quality rating assigned by ICBC field inspectors. The 1,608 survey respondents who were classified as having completed the ICBC-approved course attended a total of 160 different driving schools. Of these schools, only 11% were rated as being satisfactory by the school inspectors, 37% were rated as being in progress,

4% as not having the course, and the rest were not rated. This suggests that there may well be variability in the quality of the approved driver education course across schools. Consequently, the drivers may not, in fact, be receiving the minimum number of instructional hours – even though they may well have taken the approved driver education course – and even submitted a DOC. Clarification of this issue will not be possible without a full evaluation of the status and quality of the implementation and operation of the ICBC-approved driver education course.

7.3.1 Summary of Driver Education Participation Analysis

In the cohort study described in Chapter 6, participation in driver education was indicated by the use of DOC submission. That is, whether or not the Learner driver had submitted a DOC to ICBC. This indicator was only able to differentiate between those who took an ICBC-approved driver education course and applied for a time credit, and those who did not. For those who did not, it was not possible to determine whether the drivers had participated in an ICBC course and just not submitted a DOC, or whether they participated in some other form of driver education.

The Novice survey conducted for this study provided information that permitted clarification and classification of the driver education experience of GLP drivers. The majority (72%) of respondents had taken at least some training from a driving school. Of course, not all of these drivers took the full ICBC-approved course, nor did all of those who took the approved course submit a DOC. Using the information provided by the respondents, in conjunction with information from ICBC data sources, it was possible to define three driver education categories: 1) ICBC-approved course – with a time credit, 2) ICBC-approved course – with no time credit, 3) Driver education - but not an ICBC-approved course. The final group, the No Driver Education group, will comprise drivers who did not attend a driving school during their Learner stage.

Despite the more detailed classification of the driver education groups identified for this study, it should be noted that the classification is not perfect. As indicated by the responses in Tables 114 and 115, some drivers who claimed to have taken an ICBC-approved course may not have, and some who claimed not to have taken an ICBC-approved course actually may have. The categorization process relies, to some degree, on the respondents' recollection of the training received. Clearly, the 1,277 individuals within this group who submitted a DOC were required to have completed the ICBC-approved course. However, the remaining 331, may not have. They may have misunderstood or not known the distinction between the ICBC-approved course and other courses. Of these 331 respondents, almost half (N=162 or 49%) reported less than the minimum required classroom hours, and almost a quarter (N= 76 or 23%) reported less than the minimum required in-vehicle hours. Given that drivers who submitted a DOC gave similar responses (albeit somewhat less frequently), not all of these drivers would necessarily be misclassified. Even if they were, the estimated percentage of respondents misclassified into the approved driver education category would be only about 4% (162/4,181 =3.9%).

7.4 Preliminary Assessment of Relationship between Driver Education and Crash Involvement

Having established a working definition / classification of driver education, the next step in the analysis was to determine whether this deifinition of driver education was associated with crash involvement in a manner similar to that seen with the DOC – No DOC classification. A chi square test was used to test the association between the new measure of driver education and any crash involvement during the first 6 months of Novice licensure. The analysis was then repeated focussing on the incidence of liable crashes only. In both cases, a greater percentage of the drivers involved in crashes had completed the ICBC- approved course and, more specifically,

had completed the approved course and received a time credit. The observed associations for both analyses were highly statistically significant (P<0.0001). The results of these analyses are presented in Table 116.

Table 116. Association between Crash Involvement during the First 6 Months of Novice Licensure and Driver Education – All Crashes and Liable Crashes Only

Driver Education Group	Crash Involvement Group – All Crashes: Crash N	Crash %	No Crash N	No Crash %	Chi Square	P-Value
ICBC-Approved – with time credit	588	29.3	509	23.4		
ICBC-Approved –no time credit	259	12.9	252	11.6		
Not an ICBC Approved Course	607	30.2	791	36.4		
None	553	27.6	622	28.6		
TOTAL	2,007	100.0	2,174	100.0		
					27.43	<0.0001

Driver Education Group	Crash Involvement Group – Liable Crashes Only: Crash N	Crash %	No Crash N	No Crash %	Chi Square	P-Value
ICBC-Approved – with time credit	429	30.5	509	23.4		
ICBC-Approved –no time credit	173	12.3	252	11.6		
Not an ICBC Approved Course	418	29.8	791	36.4		
None	385	27.4	622	28.6		
TOTAL	1,405	100.0	2,174	100.0		
					28.45	<0.0001

7.5 Operational Definitions of Driving Exposure and Other Risk Factors

As mentioned previously, it has been well established in the research literature that factors such as age, gender, and amount and type of driving increase a driver's risk of crash involvement. It has also been suggested that factors such as driver overconfidence and 'risky' driving attitudes may elevate crash risk. If such variables are also associated with participation in driver education, their omission from analyses of the crash to driver education relationship could lead to inaccurate estimates of the strength, and possibly the direction, of this relationship. In order to understand and properly interpret the relationship between driver education and crash involvement it is important to first take into account the effects of other risk factors such as these (known as confounding variables) that may have a biasing effect on estimates of the crash to driver education relationship.

In this study, the age at which drivers obtained their Novice licence, their gender, and their driving exposure are considered the primary factors for inclusion as potential confounders. Variables assessing region of residence,

driver attitudes and perceived driving ability and confidence are included as factors to be explored in the event that driving exposure is not found to have a significant confounding effect. To do this, however, the variables of interest had to be defined. In particular, operational definitions that could be used in a telephone survey with drivers who would be asked to recall information from several months prior to their interview needed to be developed. For the primary variable of driving exposure, several definitions were developed. These are shown in Table 117. The operational definitions developed for the remaining variables are listed in Table 118.

Table 117. Exposure Variables and Definitions

Variable	Definition
Exposure – Month 1	Amount of driving during first month after obtaining Novice licence. Measured on a 5-point scale from 'Almost every day' to 'Not at all'.
Exposure – First 6 Months	Amount of driving during first 6 months after obtaining Novice licence. Measured on a 3-point scale: High, Moderate, Low
Exposure – Weekday Hours	Number of hours spent driving on a typical weekday during the first 6 months after obtaining a Novice licence.
Exposure – Weekend Hours	Number of hours spent driving on a typical weekend day during the first 6 months after obtaining a Novice licence.
Exposure – Weekday Kilometres	Number of kilometres driven on a typical weekday during the first 6 months after obtaining a Novice licence.
Exposure – Weekend Kilometres	Number of kilometres driven on a typical weekend day during the first 6 months after obtaining a Novice licence.
Ease of Access to a vehicle	Drivers were asked "During your first six months as a Novice driver, how often were you able to get access to drive a motor vehicle when you needed or wanted to? For analysis purposes, responses were coded: Every time, More than Half the Time, or Half the time or less.
Driving with Passengers	Drivers were asked, "During the first six months after you obtained your Novice licence, how often did you drive with two or more passengers who were not members of your family? Responses were coded: Almost every day, A few times a week, A few times a month,, A few times, or Not at all
Night-time Driving	Drivers were asked, "During the first six months after you obtained your Novice licence, how often did you drive at night between 8PM and 4AM? Responses were coded: Almost every day, A few times a week, A few times a month,, A few times, or Not at all

Table 118. Operational Definitions for Risk Factors other than Driving Exposure

Variable	Definition
Novice Age	The age at which the driver obtained his or her first Novice licence. Age was classified into four groups: 16 years, 17 years, 18 years and 19 or more years.
Gender	Male or Female
Vehicle Ownership	Used primarily as an indicator of socio-economic status. May also be an indicator of driving exposure. Drivers were asked "Are you the principal operator or registered owner of a vehicle that was licensed and insured for driving? Responses were coded: Registered owner, Principal operator, or Neither
Perceived Driving Ability	Drivers were asked, "During the first six months after you obtained your Novice licence how would you rate your driving ability compared to that of the average driver on the road?" Responses were coded on a 5-point scale from Much better to Not nearly as good.
Perceived Confidence	Drivers were asked, "How would you rate your confidence as a driver right after you obtained your Novice Licence?" Responses were coded on a 5-point scale from Very Confident to Very Unconfident.
Driving attitudes	Respondents were given four statements reflecting driving-related attitudes to which they were asked to indicate the extent of their agreement. Responses were coded on a 5-point scale from Strongly agree to Strongly Disagree. The statements were: 1) Most posted speed limits are unrealistically low, 2) It's ok to drive fast as long as you're in control, 3) On the highway, I usually like to get ahead of other drivers, and 4) When I'm driving I get impatient easily.
Speed choice	Respondents were asked to indicate how fast (in kilometres/hour) they would choose to drive "If there were no speed limits on BC's multi-lane highways and weather conditions were good and traffic light".

7.6 Assessment of Associations between Crash Involvement and Driver Education, Driving Exposure and Other Possible Explanatory Variables

A series of Chi Square tests were conducted to test for the presence of an association between crash involvement, driver education, and all of the other variables listed in Tables 117 and 118. For the first set of analyses, crash-involved drivers were identified based on their involvement in any crash (liable or not liable), or no crashes (the Crash and No Crash groups). For the second set, crash-involved drivers had to have been involved in at least one liable crash or no crashes (the Liable Crash and No Crash groups).

Table 119 presents the results of the analyses conducted to investigate associations between the Crash/No Crash groups and the driving exposure measures. Tables 120 and 121 present the results of the analyses conducted to test associations between membership in the Crash or No Crash group and the other potential risk factors, including driving-related attitudes. Tables 122, 123 and 124 present the results of the same sets of analyses but using the Liable Crash / No Crash groups as the cases and controls.

As shown in Tables 119 through 124, statistically significant associations were found between crash involvement (any crash or liable crashes only), all of the exposure variables and all but one of the other potential risk factors included in the study. Specifically, for the Crash/ No Crash group analyses, "perceived driving ability" was found not to be significantly associated with crash involvement ($P<0.282$). However, when the analyses examined the association for the Liable Crash / No Crash groups it was marginally significant ($P<0.0512$).

A greater percentage of drivers in both crash involved groups reported a higher frequency of driving, drove more frequently in higher risk conditions (at night time or with multiple passengers), and owned or were the principal operator of their own vehicle than those in the No Crash group. They also tended to report attitudes indicative of more risk-seeking or risk-tolerance than did those in the No Crash group.

As would be expected based on the literature and findings reported earlier in this evaluation, a significant association was also found between crash involvement and the age at which the driver obtained his or her Novice licence, as well as with the gender of the driver. A greater percentage of the crash-involved than the no crash group obtained their Novice licence when they were 16 years of age, and a greater percentage of crash-involved drivers were male.

The pattern of associations observed between all of the risk factors included in the study and crash group membership was similar whether the crash group included drivers who had been involved in any crash during the first 6 months of Novice driving, or if it included only those drivers who had been involved in at least one liable crash. However, the strength of the observed associations tended to be stronger for the Liable Crash /No Crash group comparisons, than for the any Crash / No Crash group comparisons.

Table 119. Analysis of Driving Exposure Measures as Potential Risk Factors for Crash Involvement during the First 6 Months of Novice Licensure – All Crashes

	Crash Involvement Group					
	Crash		No Crash			
Risk Factor	N	%	N	%	Chi Square	P-Value
Exposure – Month 1						
Almost every day	1041	52.0	852	39.3		
A few days a week	751	37.5	961	44.3		
A few days that month	153	7.6	259	12.0		
Just a day or two	39	2.0	64	3.0		
Not at all	19	1.0	33	1.5		
TOTAL	2003	100.0	2,169	100.0	75.25	<0.0001
Frequency of Driving – First 6 Months						
High Frequency	1004	50.6	812	37.9		
Moderate Frequency	772	38.9	988	46.1		
Low Frequency	210	10.6	344	16.0		
TOTAL	1986	100.0	2144	100.0	73.28	<0.0001
Exposure – Weekday Hours						
>2 hours per day	384	21.0	302	15.0		
1.1 – 2.0 hours per day	432	23.7	425	21.1		
0.51 – 1.0 hours per day	602	33.0	713	35.4		
0 – 0.50 hours per day	407	22.3	572	28.4		
TOTAL	1825	100.0	2012	100.0	38.01	<0.0001
Exposure – Weekend Hours						
>2 hours per day	605	33.0	462	23.3		
1.1 – 2.0 hours per day	533	29.0	563	28.4		
0.51 – 1.0 hours per day	457	25.0	563	28.4		
0 – 0.50 hours per day	240	13.1	394	20.0		
TOTAL	1835	100.0	1982	100.0	62.84	<0.0001
Access to a Vehicle						
Every time when wanted or needed	1149	57.7	1046	48.6		
More than half the time	452	22.7	542	25.2		
Half the time or less	392	19.7	564	26.2		
TOTAL	1993	100.0	2152	100.0	37.88	<0.0001
Driving With Passengers						
Almost every day	350	17.5	260	12.0		
A few times a week	803	40.2	767	35.4		
A few times a month	334	16.7	462	21.3		
A few times	337	18.9	445	20.6		
Not at all	175	8.8	231	10.7		
TOTAL	1999	100.0	2165	100.0	50.79	<0.0001
Night-time Driving (8pm –4am)						
Almost every day	333	16.7	214	9.9		
A few times a week	830	41.6	828	38.3		
A few times a month	391	19.6	478	22.1		
A few times	321	16.1	446	20.6		
Not at all	119	6.0	195	9.0		
TOTAL	1994	100.0	2161	100.0	66.76	<0.0001

Table 120. Analysis of other Potential Risk Factors for Crash Involvement during the First 6 Months of Novice Licensure – All Crashes

	Crash Involvement Group					
	Crash		No Crash			
Risk Factor	N	%	N	%	Chi Square	P-Value
Novice Age						
16 years	524	26.1	483	22.2		
17 Years	852	42.5	1019	46.9		
18 Years	270	13.5	298	13.7		
19 Years or More	361	18.0	374	17.2		
TOTAL	2007	100.0	2174	100.0	11.53	0.0092
Gender						
Female	921	45.9	1106	50.9		
Male	1086	54.1	1068	49.1		
TOTAL	2007	100.0	2174	100.0	10.38	0.0013
Vehicle Ownership						
Registered Owner	860	42.9	645	29.7		
Principal Operator	279	13.9	320	14.7		
Neither	868	43.3	1209	55.6		
TOTAL	2007	100.0	2174	100.0	82.97	<0.0001
Perceived Driving Ability						
Much better than average driver	336	16.8	350	16.2		
Better than average driver	543	27.2	647	30.0		
About the same as average driver	823	41.3	875	40.6		
Not as good as average driver	273	13.7	262	12.2		
Not nearly as good as average driver	20	1.0	22	1.0		
TOTAL	1995	100.0	2156	100.0	5.05	0.2820
Perceived Confidence as a Driver right after obtaining Novice licence						
Very confident	610	30.4	549	25.4		
Confident	944	47.1	1012	46.8		
Neither Confident nor Unconfident	211	10.5	335	15.5		
Unconfident	217	10.8	236	10.9		
Very Unconfident	22	1.1	31	1.4		
TOTAL	1995	100.0	2163	100.0	30.04	<0.0001

Table 121. Analysis of relationships between Attitudes towards driving and Crash Involvement during the First 6 Months of Novice Licensure – All Crashes

Risk Factor	Crash Involvement Group				Chi Square	P-Value
	Crash		No Crash			
	N	%	N	%		
Most posted speed limits are unrealistically low						
Strongly agree	145	7.3	118	5.5		
Agree	580	29.0	613	28.4		
Neither	78	3.9	94	4.4		
Disagree	972	48.7	1133	52.4		
Strongly disagree	222	11.1	204	9.4		
TOTAL	1997	100.0	2162	100.0	11.72	0.0196
It's ok to drive fast as long as you're in control						
Strongly agree	62	3.1	31	1.4		
Agree	310	15.5	354	16.4		
Neither	60	3.0	88	4.1		
Disagree	1023	51.3	1081	50.1		
Strongly disagree	539	27.0	603	28.0		
TOTAL	1994	100.0	2157	100.0	17.36	0.0016
On the highway, I usually like to get ahead of other drivers						
Strongly agree	109	5.5	86	4.0		
Agree	589	29.5	516	24.0		
Neither	99	5.0	126	5.9		
Disagree	931	46.7	1106	51.5		
Strongly disagree	266	13.3	312	14.5		
TOTAL	1994	100.0	2146	100.0	23.92	<0.0001
When I'm driving I get impatient easily						
Strongly agree	89	4.5	43	2.0		
Agree	377	18.8	352	16.2		
Neither	46	2.3	77	3.6		
Disagree	1032	51.6	1121	51.7		
Strongly disagree	457	22.8	574	26.5		
TOTAL	2001	100.0	2167	100.0	35.10	<0.0001
If there were no speed limits on BC's multi-lane highways and weather conditions were good and traffic light, I would choose to drive:						
121 km/hr or more	273	14.6	233	11.4		
101 – 120 km/hr	775	41.5	811	39.7		
80 – 100 km/hr	714	38.2	861	42.1		
<79 km/hr	107	5.7	140	6.9		
TOTAL	1869	100.0	2045	100.0	14.22	0.0026

Table 122. Analysis of Driving Exposure Measures as Potential Risk Factors for Crash Involvement during the First 6 Months of Novice Licensure – Liable Crashes Only

	Crash Involvement Group					
	Liable Crash		No Crash			
Risk Factor	**N**	**%**	**N**	**%**	**Chi Square**	**P-Value**
Exposure – Month 1						
Almost every day	700	49.9	852	39.3		
A few days a week	546	38.9	961	44.3		
A few days that month	111	7.9	259	12.0		
Just a day or two	29	2.1	64	3.0		
Not at all	16	1.1	33	1.5		
TOTAL	1402	100.0	2169	100.0	44.76	<0.0001
Frequency of Driving – First 6 Months						
High Frequency	670	48.3	812	37.9		
Moderate Frequency	564	40.7	988	46.1		
Low Frequency	153	11.0	344	16.0		
TOTAL	1387	100.0	2144	100.0	42.51	<0.0001
Exposure – Weekday Hours						
>2 hours per day	268	21.0	302	15.0		
1.1 – 2.0 hours per day	317	24.9	425	21.1		
0.51 – 1.0 hours per day	399	31.3	713	35.4		
0 – 0.50 hours per day	291	22.8	572	28.4		
TOTAL	1275	100.0	2012	100.0	38.01	<0.0001
Exposure – Weekend Hours						
>2 hours per day	419	32.7	462	23.3		
1.1 – 2.0 hours per day	369	28.8	563	28.4		
0.51 – 1.0 hours per day	313	24.5	563	28.4		
0 – 0.50 hours per day	179	14.0	394	20.0		
TOTAL	1280	100.0	1982	100.0	45.53	<0.0001
Access to a Vehicle						
Every time when wanted or needed	757	54.2	1046	48.6		
More than half the time	334	23.9	542	25.2		
Half the time or less	306	21.9	564	26.2		
TOTAL	1397	100.0	2152	100.0	12.16	0.0023
Driving With Passengers						
Almost every day	249	17.8	260	12.0		
A few times a week	559	40.0	767	35.4		
A few times a month	237	16.9	462	21.3		
A few times	233	16.6	445	20.6		
Not at all	122	8.7	231	10.7		
TOTAL	1400	100.0	2165	100.0	43.06	<0.0001
Night-time Driving (8pm –4am)						
Almost every day	230	16.4	214	9.9		
A few times a week	575	41.1	828	38.3		
A few times a month	278	19.9	478	22.1		
A few times	225	16.1	446	20.6		
Not at all	91	6.5	195	9.0		
TOTAL	1399	100.0	2161	100.0	48.85	<0.0001

Table 123. Analysis of other Potential Risk Factors for Crash Involvement during the First 6 Months of Novice Licensure – Liable Crashes

	Crash Involvement Group					
	Crash		No Crash			
Risk Factor	N	%	N	%	Chi Square	P-Value
Novice Age						
16 years	396	28.2	483	22.2		
17 Years	613	43.6	1019	46.9		
18 Years	178	12.7	298	13.7		
19 Years or More	218	15.5	374	17.2		
TOTAL	1405	100.0	2174	100.0	16.51	0.0009
Gender						
Female	627	44.6	1106	50.9		
Male	778	55.4	1068	49.1		
TOTAL	1405	100.0	2174	100.0	13.34	0.0003
Vehicle Ownership						
Registered Owner	559	39.8	645	29.7		
Principal Operator	201	14.3	320	14.7		
Neither	645	45.9	1209	55.6		
TOTAL	1405	100.0	2174	100.0	41.59	<0.0001
Perceived Driving Ability						
Much better than average driver	227	16.3	350	16.2		
Better than average driver	373	26.7	647	30.0		
About the same as average driver	568	40.7	875	40.6		
Not as good as average driver	213	15.3	262	12.2		
Not nearly as good as average driver	16	1.2	22	1.0		
TOTAL	1397	100.0	2156	100.0	9.43	0.0512
Perceived Confidence as a Driver right after obtaining Novice licence						
Very confident	418	29.8	549	25.4		
Confident	657	46.8	1012	46.8		
Neither Confident nor Unconfident	150	10.7	335	15.5		
Unconfident	161	11.5	236	10.9		
Very Unconfident	17	1.2	31	1.4		
TOTAL	1403	100.0	2163	100.0	21.06	0.0003

Table 124. Analysis of relationships between Attitudes towards driving and Crash Involvement during the First 6 Months of Novice Licensure – Liable Crashes

Risk Factor	Crash Involvement Group				Chi Square	P-Value
	Crash		No Crash			
	N	%	N	%		
Most posted speed limits are unrealistically low						
Strongly agree	110	7.9	118	5.5		
Agree	408	29.2	613	28.4		
Neither	55	3.9	94	4.4		
Disagree	682	48.8	1133	52.4		
Strongly disagree	142	10.2	204	9.4		
TOTAL	1397	100.0	2162	100.0	10.89	0.0278
It's ok to drive fast as long as you're in control						
Strongly agree	47	3.4	31	1.4		
Agree	231	16.6	354	16.4		
Neither	35	2.5	88	4.1		
Disagree	721	51.7	1081	50.1		
Strongly disagree	362	25.9	603	28.0		
TOTAL	1396	100.0	2157	100.0	22.11	0.0002
On the highway, I usually like to get ahead of other drivers						
Strongly agree	80	5.7	86	4.0		
Agree	413	29.6	516	24.0		
Neither	66	4.7	126	5.9		
Disagree	654	46.9	1106	51.5		
Strongly disagree	183	13.11	312	14.5		
TOTAL	1396	100.0	2146	100.0	22.28	0.0002
When I'm driving I get impatient easily						
Strongly agree	65	4.6	43	2.0		
Agree	271	19.3	352	16.2		
Neither	31	2.2	77	3.6		
Disagree	728	51.9	1121	51.7		
Strongly disagree	307	21.9	574	26.5		
TOTAL	1407	100.0	2167	100.0	36.77	<0.0001
If there were no speed limits on BC's multi-lane highways and weather conditions were good and traffic light, I would choose to drive:						
121 km/hr or more	187	14.3	233	11.4		
101 – 120 km/hr	541	41.4	811	39.7		
80 – 100 km/hr	505	38.6	861	42.1		
<79 km/hr	74	5.7	140	6.8		
TOTAL	1307	100.0	2045	100.0	10.10	0.0177

As noted earlier, the primary objective of this study is not to identify new risk factors for crash involvement. Rather it is to determine to what extent driver education remains a risk factor for crash involvement after taking into account the effect of other known risk factors, such as driving exposure, age and gender. A second objective is to explore to what extent the relationship between driver education and crash involvement is sustained after taking into account the suspected risk factors of vehicle ownership (as a possible indicator of socio-economic status), perceived driving ability, perceived confidence and other driver attitude variables.

Before conducting the analyses needed to adjust for the potentially confounding effects of these risk factors, a series of Chi square tests were conducted. These were done to test the univariate relationship between driver education (using the four groups defined in section 7.3) and the full set of known and suspected risk factors. By definition, only variables associated with both the outcome variable (crash involvement) and the risk factor of interest (driver education) are potential confounders. Tables 125 through 127 present the results of these analyses.

Statistically significant ($P<0.05$) associations were found between driver education and all of the driving exposure variables included in the study (Table 125). The individuals who were most likely to report a higher frequency of driving had either taken no formal driver training or an ICBC-approved course with a time credit. A similar result was obtained with respect to vehicle access. However, driving under riskier conditions (i.e., with passengers or at night-time) was most likely to be reported by those who took an ICBC driver education course with a time credit. Drivers who took no formal driver education reported driving with passengers or at night with about the same frequency as those who took an ICBC course, without a time credit, and as those who took some other form of driver education.

Statistically significant ($P<0.05$) associations were also found between driver education, novice age, gender, vehicle ownership and perceived driving ability, and confidence (Table 126). However, once again, the nature of the relationship differed somewhat across the variables. A much higher percentage of drivers who took an ICBC course and received a time credit, that those in the other driver education groups, were 16 years of age when they obtained their Novice. Similarly, a higher percentage of the drivers who took the ICBC course for time credit than those in the other three groups thought their driving ability was better than that of the average driver. Conversely, drivers who took no formal driver education were more likely to indicate that they were very confident in their ability to drive right after obtaining their Novice licence than were drivers in the other groups. With respect to gender and vehicle ownership, individuals who took no driver education and those who took an ICBC course for a time credit were more likely to be male, and to be a registered owner of a motor vehicle than those in the other two driver education groups. A higher percentage of female than male drivers took an ICBC course with no time credit group, or took driver education that was not ICBC-approved.

In contrast to the risk factors examined thus far, few associations were identified between driver education and the driving-related attitude variables included in the study (Table 127). In fact, a statistically significant association was obtained for only one of the five of these variables. Specifically, when drivers were asked to indicate how fast they would choose to drive if there were no speed limits on BC highways and weather was good, and traffic light, a higher percentage of drivers in the group that took an ICBC course but did not receive a time credit, and in the group that took some driver education, but not an approved course gave more conservative estimates than those in the other two groups. Due to the lack of association found between the other attitude variables and driver education, only this “speed choice” variable was selected from the pool of ‘attitude’ items for inclusion as a potential confounder in subsequent analyses of the crash involvement – driver education relationship.

Table 125. Associations between Driver Education and Driving Exposure Measures

Risk Factor	Driver Education Group									
	Approved w/ Credit		Approved- No Credit		Not Approved		None			
	N	%	N	%	N	%	N	%	Chi Square	P-Value
Exposure – Month 1										
Almost every day	571	52.2	197	38.6	565	40.4	560	47.9		
A few days a week	413	37.7	227	44.5	611	43.7	461	39.4		
A few days that month	76	6.9	61	12.0	153	11.0	122	10.4		
Just a day or two	27	2.5	13	2.6	42	3.0	21	1.8		
Not at all	8	0.7	12	2.4	26	1.9	6	0.5		
TOTAL	1095	100.0	510	100.0	1397	100.0	1170	100.0	67.18	<0.0001
Frequency of Driving – First 6 Months										
High Frequency	540	49.6	188	37.4	542	39.3	546	47.0		
Moderate Frequency	433	39.8	230	45.7	620	45.0	477	41.1		
Low Frequency	115	10.6	85	16.9	216	15.7	138	12.0		
TOTAL	1088	100.0	503	100.0	1378	100.0	1161	100.0	46.14	<0.0001
Exposure – Weekday Hours										
>2 hours per day	166	16.4	69	14.7	217	16.9	234	21.9		
1.1 – 2.0 hours per day	211	20.8	108	23.1	279	21.7	259	24.2		
0.51 – 1.0 hours per day	369	36.4	171	36.5	432	33.6	343	32.0		
0 – 0.50 hours per day	268	26.4	120	25.6	356	27.7	235	21.9		
TOTAL	1014	100.0	468	100.0	1284	100.0	1071	100.0	28.92	0.0007
Exposure – Weekend Hours										
>2 hours per day	282	27.8	125	27.0	327	25.7	333	31.3		
1.1 – 2.0 hours per day	300	29.6	129	27.9	356	27.9	311	29.2		
0.51 – 1.0 hours per day	276	27.2	125	27.0	348	27.3	271	25.5		
0 – 0.50 hours per day	157	15.5	84	18.1	243	19.1	150	14.1		
TOTAL	1015	100.0	463	100.0	1274	100.0	1065	100.0	18.56	0.0292
Access to a Vehicle										
Every time when wanted or needed	624	57.1	246	48.7	680	49.2	645	55.3		
More than half the time	264	24.2	139	27.5	349	25.3	242	20.8		
Half the time or less	205	18.8	120	23.8	352	25.5	279	23.9		
TOTAL	1093	100.0	505	100.0	1381	100.0	1166	100.0	31.55	<0.0001
Driving With Passengers										
Almost every day	198	18.1	61	12.1	175	12.6	176	15.0		
A few times a week	481	43.9	187	37.0	460	33.0	442	37.8		
A few times a month	200	18.3	92	18.2	279	20.0	225	19.2		
A few times	148	13.5	101	20.0	320	23.0	213	18.2		
Not at all	69	6.3	64	12.7	159	11.4	114	9.7		
TOTAL	1096	100.0	505	100.0	1393	100.0	1170	100.0	87.49	<0.0001
Night-time Driving (8pm –4am)										
Almost every day	151	13.9	67	13.3	153	11.0	176	15.1		
A few times a week	518	47.5	184	36.4	518	37.2	438	37.5		
A few times a month	211	19.4	110	21.8	296	21.3	252	21.6		
A few times	158	14.5	90	17.8	299	21.5	220	19.0		
Not at all	52	4.8	54	10.7	127	9.1	81	6.9		
TOTAL	1090	100.0	505	100.0	1393	100.0	1167	100.0	71.21	<0.0001

Table 126. Associations between Driver Education, Novice Age, Gender, Vehicle Ownership and Perceived Driving Ability and Confidence

	Driver Education Group									
	Approved w/ Credit		Approved- No Credit		Not Approved		None			
Risk Factor	N	%	N	%	N	%	N	%	Chi Square	P-Value
Novice Age										
16 years	563	51.3	65	12.7	192	13.7	187	15.9		
17 Years	372	33.9	226	44.2	704	50.4	569	48.4		
18 Years	72	5.7	95	18.6	218	15.6	193	16.4		
19 Years or More	100	9.1	125	24.5	284	20.3	226	19.2		
TOTAL	1097	100.0	511	100.0	1398	100.0	1175	100.0	639.87	<0.0001
Gender										
Female	510	46.5	292	57.1	733	52.4	492	41.9		
Male	587	53.5	219	42.9	665	47.6	683	58.1		
TOTAL	1097	100.0	511	100.0	1398	100.0	1175	100.0	46.37	<0.0001
Vehicle Ownership										
Registered Owner	421	38.4	163	31.9	465	33.3	456	38.8		
Principal Operator	165	15.0	87	17.0	179	12.8	168	14.3		
Neither	511	46.6	261	51.1	754	53.9	551	46.9		
TOTAL	1097	100.0	511	100.0	1398	100.0	1175	100.0	24.10	0.0005
Perceived Driving Ability										
Much better than average driver	170	15.6	96	19.1	223	16.0	197	16.9		
Better than average driver	370	33.9	131	26.0	389	28.0	300	25.8		
About the same as average driver	411	37.6	216	42.9	562	40.4	509	43.7		
Not as good as average driver	132	12.1	55	10.9	205	14.7	143	12.3		
Not nearly as good as average driver	9	0.8	6	1.2	12	0.9	15	1.3		
TOTAL	1092	100.0	504	100.0	1391	100.0	1164	100.0	31.61	0.0016
Perceived Confidence as a Driver right after obtaining Novice licence										
Very confident	305	27.9	124	24.3	340	24.4	390	33.5		
Confident	513	47.0	238	46.7	714	51.2	491	41.9		
Neither Confident nor Unconfident	145	13.3	72	14.1	172	12.3	157	13.4		
Unconfident	116	10.6	73	14.3	148	10.6	116	9.9		
Very Unconfident	13	1.2	3	0.6	20	1.4	17	1.5		
TOTAL	1092	100.0	510	100.0	1394	100.0	1171	100.1	42.89	<0.0001

Table 127. Associations between Driver Education and Driving-Related Attitudes

Risk Factor	Driver Education Group								Chi Square	P - Value
	Approved w/ Credit		Approved- No Credit		Not Approved		None			
	N	%	N	%	N	%	N	%		
Most posted speed limits are unrealistically low										
Strongly agree	73	6.7	29	5.7	86	6.2	75	6.4		
Agree	334	30.5	145	28.6	398	28.6	316	27.2		
Neither	38	3.5	23	4.5	63	4.5	48	4.1		
Disagree	542	49.5	252	49.7	711	51.1	600	51.6		
Strongly disagree	109	10.0	58	11.4	134	9.6	125	10.7		
TOTAL	1096	100.0	507	100.0	1392	100.0	1164	100.0	6.88	0.8656
It's ok to drive fast as long as you're in control										
Strongly agree	28	2.6	17	3.3	24	1.7	24	2.1		
Agree	180	16.5	86	16.9	208	15.0	190	16.3		
Neither	34	3.1	16	3.1	50	3.6	48	4.1		
Disagree	553	50.8	256	50.2	712	51.4	583	50.0		
Strongly disagree	294	27.0	135	26.5	392	28.3	321	27.5		
TOTAL	1098	100.0	510	100.0	1386	100.0	1166	100.0	9.10	0.6943
On the highway, I usually like to get ahead of other drivers										
Strongly agree	55	5.1	26	5.1	61	4.4	53	4.6		
Agree	287	26.5	123	24.3	358	25.8	337	29.0		
Neither	62	5.7	23	4.6	76	5.5	64	5.5		
Disagree	540	49.8	256	50.6	700	50.5	541	46.6		
Strongly disagree	141	13.0	78	15.4	192	13.8	167	14.4		
TOTAL	1085	100.0	506	100.0	1387	100.0	1162	100.0	9.58	0.6519
When I'm driving I get impatient easily										
Strongly agree	39	3.6	19	3.7	38	2.7	36	3.1		
Agree	206	18.9	94	18.4	245	17.6	184	15.7		
Neither	42	3.8	11	2.2	39	2.8	31	2.7		
Disagree	566	51.8	272	53.2	708	50.8	607	51.9		
Strongly disagree	240	22.0	115	22.5	364	26.1	312	26.7		
TOTAL	1093	100.0	511	100.0	1394	100.0	1170	100.0	17.66	0.1264
If there were no speed limits on BC's multi-lane highways and weather conditions were good and traffic light, I would choose to drive:										
121 km/hr or more	162	15.7	57	12.0	131	10.0	156	14.3		
101 – 120 km/hr	412	39.9	187	39.4	506	38.6	481	44.0		
80 – 100 km/hr	407	39.4	192	40.4	573	43.7	403	36.8		
<79 km/hr	53	5.1	39	8.2	101	7.7	54	4.9		
TOTAL	1034	100.0	475	100.0	1311	100.0	1094	100.0	40.83	<0.0001

7.7 Analysis of Crash Involvement – Driver Education Relationship

Logistic regression analysis was used to estimate the odds ratios for each of the three driver education groups: 1) Approved course with time credit, 2) Approved course with no time credit, and 3) Not an approved course. For the purpose of computing odds ratios, the drivers who did not attend driving school were used as the reference group. Table 128 shows the results of the analysis for the Crash / No Crash groups using driver education as the only risk factor in the model. Table 129 shows the results of the same analysis but for the Liable Crash / No Crash groups. The odds ratios computed in these tables are referred to as unadjusted odds ratios because they are computed without any effort to adjust for the potentially confounding effects of other risk factors (e.g., age, gender, and driving exposure).

Table 128. Estimates of the Unadjusted Odds Ratios describing the Crash Involvement to Driver Education Association – All Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	1,097	1.30	1.10 – 1.53	0.0019
ICBC-Approved – no time credit	511	1.16	0.94 – 1.42	0.1716
Not an ICBC-Approved course	1,398	0.86	0.73 – 1.01	0.0643
None (reference)	1,175	1.00		
TOTAL	4,181			

The results in Tables 128 and 129 indicate that Novice drivers who completed an ICBC-approved driver education course with a time credit, had a greater odds of being involved in one or more crashes (liable or not liable) than drivers who did not take any formal driver education. Drivers who took an ICBC-approved course but did not receive a time credit, and those who did not take an approved course did not differ significantly from those who took no formal driver education. It should be noted, however, that drivers who took some formal training, but not the ICBC-approved course tended to have a lower odds of crash involvement than drivers who took no driver education.

Table 129. Estimates of the Unadjusted Odds Ratios describing the Crash Involvement to Driver Education Association – Liable Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	938	1.36	1.14 – 1.63	0.0008
ICBC-Approved – no time credit	425	1.11	0.88 – 1.40	0.3807
Not an ICBC-Approved course	1,209	0.85	0.72 – 1.02	0.0745
None (reference)	1.007	1.00		
TOTAL	3,579			

To determine what effect driving exposure would have on the crash involvement - driver education relationship, additional logistic regression analyses were run using Novice age, gender, driver education and each of the exposure measures listed in Table 117. The inclusion of Novice age and gender alone in the models modified the magnitude of the estimated odds ratios shown in Tables 128 and 129, but only slightly. By adding exposure to the model, however, the relative odds were adjusted by several percentage points, particularly for the drivers who took an approved course but did not receive a time credit.

The pattern of results observed from the analyses was the same regardless of the particular driving exposure measure included in the model. Consequently, only the results of one of the models are provided here. In this model, frequency of driving during the first six months of Novice licensure was selected as the exposure measure. This is a categorical variable with 3 classes indicating High, Moderate, or Low driving frequency. The estimated odds ratios describing the strength of the crash involvement - driver education relationship, after adjustment for Novice age, gender, and driving frequency are shown in Tables 130 and 131. In Table 130, the model was developed using involvement in any crash versus no crash involvements as the outcome of interest. In Table 131, the outcome of interest was involvement in any liable crash versus no crash involvements.

Table 130. Estimates of the Odds Ratios describing the Crash Involvement to Driver Education Association after Adjustment for Novice Age, Gender, and Frequency of Driving During First Six Months of Novice Licensure – All Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	1,088	1.27	1.07 – 1.52	0.0073
ICBC-Approved – no time credit	503	1.26	1.01 – 1.55	0.0365
Not an ICBC-Approved course	1,378	0.92	0.79 – 1.08	0.3149
None (reference)	1,161	1.00		
TOTAL	4,130			

Table 131. Estimates of the Odds Ratios describing the Crash Involvement to Driver Education Association after Adjustment for Novice Age, Gender, and Frequency of Driving During First Six Months of Novice Licensure – Liable Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	930	1.30	1.07 – 1.58	0.0081
ICBC-Approved – no time credit	417	1.21	0.95 – 1.53	0.1202
Not an ICBC-Approved course	1,190	0.91	0.76 – 1.09	0.2903
None (reference)	994	1.00		
TOTAL	3,531			

The key finding from these analyses is that even after adjustment for the well known risk factors of Novice age, gender, and driving exposure, the odds of crash involvement for drivers who participated in the ICBC-approved course remained higher than the odds for drivers who received no formal driver education, or who took some

driver education but not an ICBC course. The same relationship held whether the outcome of interest included any crash involvement or liable crash involvements only. In both cases, by adjusting for age, gender, and exposure, the estimated relative odds of crash involvements went down slightly for those who completed an ICBC course and received a time credit, and increased slightly for those who took the course but did not receive a time credit. The estimated odds ratio for those who did not take an ICBC course but did take some driver education approached one, indicating little difference in crash odds from that of the reference group (no driver education).

These findings suggest that although driving exposure does appear to be a significant risk factor for crash involvement, its effect as a potential confounder in the crash involvement - driver education relationship is relatively minor. Further research using different driver samples and different exposure measures will be required to confirm these findings. However, based on the findings of this study it would appear that driving exposure alone is not the primary factor differentiating between the crash odds of those who participate in a comprehensive driver education course and those who do not.

It was noted previously that, in addition to driving exposure, other factors have may influence the crash involvement - driver education relationship. These include factors such as driver confidence, perceived driving ability, and attitudes toward risky driving behaviours. Vehicle ownership may also be a factor. As indicated in the previous section, however, only driver confidence, choice of speed, and vehicle ownership were found in this study to be significantly associated with both crash involvement and driver education. Consequently, these are the only variables that were considered potential confounders.

Tables 132 and 133 show the results of logistic regression analyses that were conducted to estimate the effect on the driver education odds ratios of adding the perceived confidence of the Novice Drivers into the model. The addition of this variable had very little impact on the estimated odds ratios. Consequently, it would appear that although the univariate analyses conducted previously had identified it as a potential confounder, its confounding effects were relatively minor, after adjustment for the other variables in the model.

Table 132. Estimates of the Odds Ratios describing the Crash Involvement to Driver Education Association after Adjustment for Novice Age, Gender, Frequency of Driving During First Six Months of Novice Licensure, and Perceived Confidence – All Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	1,083	1.29	1.08 – 1.54	0.0054
ICBC-Approved – no time credit	502	1.26	1.02 – 1.56	0.0330
Not an ICBC-Approved course	1,374	0.93	0.79 – 1.09	0.3393
None (reference)	1,157	1.00		
TOTAL	4,116			

Table 133. Estimates of the Odds Ratios describing the Crash Involvement to Driver Education Association after Adjustment for Novice Age, Gender, Frequency of Driving During First Six Months of Novice Licensure, and Perceived Confidence – Liable Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	925	1.31	1.08 – 1.59	0.0061
ICBC-Approved – no time credit	416	1.21	0.96 – 1.54	0.1126
Not an ICBC-Approved course	1,186	0.91	0.76 – 1.09	0.2908
None (reference)	991	1.00		
TOTAL	3,518			

Very similar results were obtained when speed choice and vehicle ownership were included in the models. Consequently, the results are not shown. The estimated odds ratios resulting from the models in which these variables were included were almost identical to those shown in Tables 132 and 133.

Analyses were also undertaken to explore relationships with other factors. It has been suggested in the literature, for instance, that perhaps there is less parental involvement in the education of new drivers who take driver education courses such as that provided in the ICBC-approved course. While questions concerning parental involvement in the driver education process were not included in the telephone survey, drivers were asked who they thought was most responsible for teaching them to drive. Although, there was a strong association ($P<0.0001$) between driver education group and whether respondents selected family or friends, driving school, or a private instructor as being most responsible, no association was observed between this factor and crash involvement ($P>0.46$). Not surprisingly, drivers who took a full ICBC course were more likely to identify the school as being most responsible for teaching them to drive. Those who took some driver education, but not the full ICBC-course, were more likely to identify friends and family as being most responsible for teaching them to drive.

Region of residence was also explored for its potential effects on the crash involvement - driver education relationship. Region was based on place of residence when the GLP driver was issued his or her Novice licence. The odds ratios for the crash involvement - driver education relationship, after adjustment for driver age, gender, driving exposure and region of residence are shown in Tables 134 and 135. For any crash involvements and for liable crashes only the pattern of results was similar. With region added into the model, the estimated relative odds of a crash for the group of drivers who took an ICBC course with a time credit was lower than the estimated relative odds obtained when region was not included in the model. Similarly, the relative odds obtained for the group that took an ICBC course but did not receive a time credit was lower. However, both were still greater than one indicating an elevated odds of crash involvement relative to drivers who took no formal driver education. However, only the odds ratio computed for the group who took the course for a time credit was significantly ($P<0.05$) greater than one. Finally, drivers who took some driver education, but not an approved course, still had an estimated relative odds that was less than one.

These findings suggest that region of residence is an important confounder in the crash - driver education relationship. Further research will be required to determine whether similar results would be obtained if Region was more precisely defined, geographically. Such additional subgroup analyses were not conducted in this study as the sample sizes in the defined groups were already getting quite small.

Table 134. Estimates of the Odds Ratios describing the Crash Involvement to Driver Education Association after Adjustment for Novice Age, Gender, Frequency of Driving During First Six Months of Novice Licensure, and Region of Residence – All Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	1,088	1.21	1.01 – 1.45	0.0422
ICBC-Approved – no time credit	503	1.19	0.96 – 1.48	0.3135
Not an ICBC-Approved course	1,378	0.86	0.73 – 1.01	0.0562
None (reference)	1,161	1.00		
TOTAL	4,130			

Table 135. Estimates of the Odds Ratios describing the Crash Involvement to Driver Education Association after Adjustment for Novice Age, Gender, Frequency of Driving During First Six Months of Novice Licensure, and Region of Residence – Liable Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	930	1.23	0.89 – 1.45	0.0401
ICBC-Approved – no time credit	417	1.14	0.96 – 1.54	0.3050
Not an ICBC-Approved course	1,190	0.84	0.70 – 1.01	0.0600
None (reference)	994	1.00		
TOTAL	3,518			

One factor that has been consistently identified in the literature as a risk for crash involvement is age of licensure. This relationship was confirmed in this study, as well in the cohort studies described earlier. In addition, in the DOC / No Doc cohort study, and in this case-control study, the highest percentage of drivers taking an approved driver education course were still 16 years of age when they graduated to the Novice stage. Thus, it appears that one of the issues involved in the crash – driver education relationship is likely related to the fact that the youngest drivers, who tend to be at greatest risk, are the ones who are moving through the supervised Learner stage the most quickly. It could, therefore, be a combination of the lack of maturity and inexperience of these young drivers that is contributing most significantly to the higher Novice driver crash rates observed for drivers who complete driver education for a time credit.

To further investigate the role of age in the crash – driver education relationship, an exploratory analysis was undertaken to examine the age-specific effects of driver education on crash involvement. For these analyses, due to the small number of drivers in the survey who took the ICBC course and obtained their Novice licence at 18 years of age (Table 126), the 17 and 18 year old age groups were combined. Preliminary analyses of the 17, 18 and 19+ year age groups suggested that the 18 year olds were more similar in characteristics to 17 year olds than they were to the 19+ year old age group.

Although the data were analyzed using both any crash involvement and only liable crash involvements as the outcome of interest, the results were very similar. Consequently, only the result for liable crash involvements are presented. The results of the analyses conducted for 16 year olds are shown in Table 136.

Table 136. Estimates of the Odds Ratios describing the Crash Involvement to Driver Education Association for Drivers who obtained their Novice Licence at 16 years of age after adjustment for Gender, Frequency of Driving During First Six Months of Novice Licensure, and Region of Residence – Liable Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	488	1.45	1.01 – 2.11	0.0481
ICBC-Approved – no time credit	55	2.30	1.22 – 4.41	0.0106
Not an ICBC-Approved course	166	0.86	0.55 – 1.35	0.5089
None (reference)	167			
TOTAL	876			

The major finding of interest in Table 136 is that both of the driver education groups that took an ICBC course had odds ratios significantly ($P<0.05$) greater than 1. This suggests that drivers in both of these groups were more likely than drivers who took no driver training to be involved in a crash. Drivers who took some driver training but not the full ICBC course had an odds ratio that was less than one. However, the lower odds of crash involvement (relative to the no driver training group) indicated by this result was not statistically significant.

Tables 137 and 138 show the results of the same analysis conducted with drivers who obtained their Novice licence at 17 or 18 years of age, or at 19 years of age or older. In both cases, the magnitude of the odds ratios suggested a somewhat higher odds of crash involvement for drivers who took an ICBC-approved course and received a time credit than those who took no driver training. The small sample sizes in the subgroups, however, limited the ability to detect these increases as statistically significant. In fact, in both tables the only statistically significant finding was for 17 and 18 year olds who took some driver training, but not the ICBC course. Even after adjustment for gender, driving exposure, and region of residence, these drivers had a significantly lower odds of crash involvement than drivers who took no formal training. It should also be noted, however, that the sample size in this group was larger than in any of the others, making it easier to detect statistical significance.

Table 137. Estimates of the Odds Ratios describing the Crash Involvement to Driver Education Association for Drivers who obtained their Novice Licence at 17and 18 years of age after adjustment for Gender, Frequency of Driving During First Six Months of Novice Licensure, and Region of Residence – Liable Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	363	1.14	0.87 – 1.50	0.3390
ICBC-Approved – no time credit	269	1.06	0.78 – 1.44	0.6964
Not an ICBC-Approved course	800	0.77	0.61 – 0.97	0.0236
None (reference)	643			
TOTAL	2,075			

Table 138. Estimates of the Odds Ratios describing the Crash Involvement to Driver Education Association for Drivers who obtained their Novice Licence at 19 or more years of age after adjustment for Gender, Frequency of Driving During First Six Months of Novice Licensure, and Region of Residence – Liable Crashes

Risk Factor	N	Odds Ratio	95% Confidence Interval	P-Value
DRIVER EDUCATION GROUP				
ICBC-Approved – with time credit	79	1.36	0.78 – 2.36	0.2839
ICBC-Approved – no time credit	93	0.91	0.52 – 1.58	0.7404
Not an ICBC-Approved course	224	1.07	0.70 – 1.63	0.7716
None (reference)	184			
TOTAL	580			

The results shown in Tables 136 through 138 reveal some interesting trends that may need to be followed up in subsequent research. First, the majority (55.7%) of drivers who obtained their Novice licence when they were 16 took the ICBC course, and took it for a time credit. By comparison, only 17.5% of the 17-18 year old drivers, and 13.6% of the drivers aged 19 years or more were in this driver education group. Instead, drivers in these two older age groups were most likely to have taken no driver training (31.0% and 38.6%, respectively) or to have taken some training but not an ICBC course (38.6.0% and31/7%, respectively).

Secondly, only 55 of the 876 drivers (6.3%) in the 16-year old group took the full course and did not obtain a time credit. In contrast, 13.0% of the 17 and 18 year olds, and 16.0% of the drivers aged 19 years or more were in this group. However, neither of the older aged groups in this driver education category showed the same highly elevated odds of crash involvement that was seen with the 16-year old group. This suggests there may be something different about the subgroup of drivers who took an ICBC-course, did not receive a time credit, but still graduated into the Novice stage at age 16. Perhaps these are drivers who took the course intending to obtain a time credit, but who were unable to pass their road test. If so, then perhaps the elevated odds of crash involvement for this group is attributable to poorer driving skills on the part of these young drivers. Thus, not only are these drivers very young and inexperienced when they graduate to the Novice stage, but they may also be less skilled. If so, they would be a group at high risk of crash involvement.

An examination of the distribution of drivers who took the ICBC- approved course, but did not obtain a time credit, indicated that 65% of the 16-year olds in this group had graduated to the Novice stage right around the end of the sixth month of their Learner stage. This compared to only 47% of the 17-18 year olds, and 55% of those aged 19 years or more. Thus, a greater percentage of the 16-year olds in this driver education group appear to have been somewhat more motivated than drivers in the other age groups to complete the Learner stage as quickly as possible. This finding, coupled with the higher odds ratio obtained for this group than for the group of 16-year olds who took the ICBC course and received a time credit, suggests that there may be a skill factor involved. However, further research will be required to explore this hypothesis.

Clearly, something is influencing the crash involvement rates of drivers who complete an ICBC-approved course in a manner that differentiates them from drivers who do not take such a course. Several factors have been examined in this study, but no clear explanations have been found. One factor that does appear to be affecting the crash – driver education relationship is the offering of a time credit. This is the one variable that most clearly differentiates between drivers who complete an ICBC course and those who do not. And, although elevated crash odds ratios were observed for the group of drivers who completed the course for time credit, and for those who did not, a significant percentage (~26%) of this latter group did indicate that they had taken the course in order to obtain their Novice licence sooner. These drivers may have failed their first attempt at the road test and, consequently, were unable progress as quickly as they would have liked. Nonetheless, the shared similar motivation as the group of drivers who did receive a time credit and, given the small number of drivers in the "Approved course – no time credit" group, this may have contributed to the higher crash odds of this group.

Another possibility is that, despite efforts that were made to develop a driver education curriculum that would raise the standards of training for new drivers, the ICBC –approved course may not be meeting expectations. This could be due to inconsistent implementation of the curriculum by the driver training industry, a lack of commitment to the principles of the curriculum as outlined in *Mapping a Safe Course,* or to problems with the timing or content of the curriculum itself. Without an evaluation of the curriculum, and the industry's implementation of it, it is not possible to discount this as a possible explanation.

ICBC's Driver Training and Assessments and Standards Department did provide some data relevant to a ranking of the quality of the Driver Training School that were attended by the respondents in the present study. Unfortunately, too few schools had been rated on this scoring system to enable reliable analysis of the influence of school quality on the odds of crash involvement for drivers who completed an ICBC-approved course.

Given the significantly lower odds of crash involvement found for drivers who took some formal driver training, but not a full ICBC-approved course, it is unlikely that problems with the curriculum and /or its implementation will fully account for the higher crash odds associated with the drivers who completed it. The results of this study, and the cohort study described in the previous section, suggest that it has more to do with the offering of a time credit, the young age of the majority of drivers who are taking the course for time credit, and the speed with which many of these youngest drivers are passing through the supervised Learner stage. The motivation of the drivers who wish to complete the Learner stage as quickly as possible, regardless of age, may also be quite different from that of drivers who are not in as much of a hurry. Further investigation into such factors will be required before the crash – driver education relationship will be fully understood.

7.8 Summary

The primary purpose of the case-control study described here was to determine whether the higher incidence of crash involvements associated with drivers who participate in driver education could be due to differences in driving exposure. Higher crash rates for drivers who take driver education have been documented in this evaluation of GLP and in a number of other studies (Mayhew & Simpson, 1996; Boase & Tasca, 1998; Mayhew

et. al, 2003). Of particular interest in the present study was the relationship between the crash involvements of GLP drivers who participated in a complete ICBC-approved driver education course, and received a time credit, those who took the ICBC-course but did not receive a time credit, those who took some driver education but not the ICBC-course, and those who took no formal driver education.

The results of this study confirmed the association between crash involvement and participation in driver education. More importantly the findings revealed that the association was maintained, even after adjustment for the confounding effects of age, gender, and driving exposure. Interestingly, the association was only obtained among drivers who completed an ICBC-approved course. Those who took some driver education but not the ICBC-approved course tended to have a similar or lower odds of crash involvement compared to drivers who did not take any formal driver education.

Several factors were explored in an effort to identify factors that could explain the observed association between completion of an approved course and crash involvement. The most likely candidates appear to be the speed with which drivers who take an approved course pass through the Learner stage, their motivation for taking an approved driver education course, and possibly personality factors not examined in this study. Many of the drivers that complete the course may lack the maturity and experience necessary to reduce their crash risk to the level of drivers who, even if they take some driver education, are not as motivated to obtain their Novice licence as quickly.

Problems with the form and content of the course itself may also be an issue. Perhaps a curriculum that spans a greater length of time and is less compressed than the current curriculum would be more effective. On the other hand, perhaps expecting any driver education course to reduce Novice driver crashes is unreasonable. Maybe the objectives of driver education need to be redefined in such a way that crash reductions are not the primary outcome of interest. Clearly driver education serves many valid and valued practical purposes. Some new drivers don't have access to an eligible supervising driver, or they may need more time on the road than a parent or other supervising driver can provide. Professional instructors may also be more up to date in their knowledge and vehicle handling skills. As reported in the Year 2 interim evaluation report (Appendix C), a much higher percentage of drivers who took approved driver education than those who did not passed their Novice road test on their first attempt (78% and 65%, respectively).

More research will be required before the associations between the incidence of Novice driver crashes, driver education, driving exposure, and other potential factors are well understood. Nonetheless, the current evaluation was unable to demonstrate a positive benefit (in terms of crash reductions) associated with the ICBC-approved driver education course. These findings are consistent with those reported in other jurisdictions. Both Ontario and Nova Scotia have reported higher crash rates for Novice drivers who completed the approved driver education courses in their jurisdictions. And like BC, both of these jurisdictions offered time incentives, within their graduated licensing programs, to promote participation in driver education.

The results reported in this evaluation, and by other jurisdictions, provide little support for the provision of time incentives for completion of an approved driver education course. In fact, the results suggest that time incentives may well be detrimental. Until a driver education course can be developed and shown to reduce the incidence of Novice crash rates, no incentives are truly justified – unless the goal is something other than a reduction in Novice driver crashes. However, an incentive that involves shortening the Learner stage may always be counterproductive, particularly for licensing programs that already have relatively short Learner stages.

Section 8. Recommendations

The following recommendations are made based on the findings of this evaluation (and previous interim evaluations). To optimize the benefits attainable through GLP:

1. The GLP minimum Learner stage should be extended. This recommendation arose out of the Year 2 Interim evaluation and is supported by the results of the Year 3 evaluation. In response to recommendation made on the basis of the Year 2 evaluation, the GLP Learner stage has been extended to a minimum of 12 months. This change became effective with the implementation of GLPe, October 6, 2003.

2. Additional restrictions and conditions should be applied in the GLP Novice stage. This recommendation also arose out of the Year 2 Interim evaluation and is supported with the findings in the Year 3 evaluation. The research literature on risk factors for new driver crashes, and concern from internal and external stakeholders to find ways to promote safer driving behaviours among drivers in the Novice stage prompted the development of passenger restrictions, a prohibition-free requirement for Novice drivers, and changes in the definition of a supervising driver. As with the Learner stage extension, these changes became effective with the implementation of GLPe, October 6, 2003.

3. The time incentive associated with completion of an approved driver education course should be considered for removal. The present evaluation found no evidence of safety benefits (crash reductions) for drivers who completed the ICBC-approved course. Nor was evidence obtained to suggest that differences in driving exposure between those who did and did not take the course could explain the observed results. Consequently, the provision of a time incentive does not appear to be justified at this time. In fact, the results suggest that shortening the Learner stage for drivers who complete an approved course may have a negative impact on the incidence of Novice driver crashes.

4. Consultations should be undertaken with the driver training industry to review the future of the approved driver education curriculum as a component of GLP.

5. A final evaluation of GLP, including assessment of the effectiveness of the Class 5/6 road test, and inclusion of drivers who have experienced the fully implemented program (2001 driver cohort) should be undertaken. Due to the stage implementation of the program, it has not yet been possible to evaluate the effectiveness of the fully implemented GLP. As noted in this evaluation, the 1998-99 cohort of GLP drivers was the earliest cohort to experience GLP. During 1998, drivers in GLP had only limited access to an approved driver education course. In the years since, the course has been more widely disseminated and work has been ongoing to improve the curriculum and its implementation. These improvements may serve to reduce some of the high crash rates observed. As well, no work has yet been done to see if the road tests developed for GLP (particularly the exit test) have predictive validity. Research needs to be conducted to determine if taking and passing the road test is associated with lower crash rates.

Section 9. Comparison to Other Jurisdictions

Over the last few years a number of jurisdictions have published results of their evaluations of their graduated licensing programs. All jurisdictions have shown a reduction in crashes after implementing graduated licensing. This section compares results of this evaluation to the evaluation of other jurisdictions for those jurisdictions that have undertaken evaluation that are similar to BC's. Where results differ, some analysis has been done to try to understand the differences.

9.1 Graduated Licensing Programs in Other Jurisdictions

It seems that no two programs are alike. Many programs in the United States apply only to teenagers under the age of 18. Restricting the program to specific ages does not take into account the higher crash risk that applies to all new drivers due to inexperience.

Restrictions vary. Many jurisdictions have night-time restrictions. However, they vary from a 6:00 p.m. to a 1:00 AM start time and a 5:00 AM or 6:00 AM end time. Some jurisdictions limit passengers in the Learner and Intermediate stage; however, again, some of these restrictions only limit passengers to the number of seatbelts - allowing four or more teenage passengers. Length of the Learner stage varies from six months to 12 months. Although jurisdictions specify a minimum Learner stage, in some cases, this can be reduced by three or four months upon completion of approved driver training resulting in a Learner stage as short as three months as is the case in BC. Likewise, the length of the Intermediate stage also varies and ranges in length from nine months to two years.

Only two jurisdictions in North America (Ontario and British Columbia) have a second level road test which new drivers are required to pass prior to receiving a full-privilege licence. A third jurisdiction, Alberta, plans to implement such a test in May 2005.

Many jurisdictions require the new driver to remain conviction-free for a period of time prior to receiving a full privilege licence; some jurisdictions extend the time new drivers stay in the program if a certain number of violations are received; some jurisdictions prohibit new drivers from driving when they reach a lower penalty point threshold than full privilege licence holders and still other jurisdictions use a combination of the above.

9.2 Evaluation Results

Evaluation methods and results varied from jurisdiction to jurisdiction and results are not always comparable; however, what is clear is that all jurisdictions that have implemented some form of graduated licensing have seen a significant reduction in crashes over a one- or two-year period following implementation.

Many jurisdictions evaluated the crash data of 16-year-olds before and after implementation, as they were the only group of drivers that could be identified as possibly being affected by the implementation of GLP. Not being able to directly identify new drivers using licensing data usually resulted in crash rates being calculated based on population figures rather than licensed drivers. This does not take into account fluctuations in the number of drivers obtaining Learner licences before and after program implementation, nor does it take into account the differing lengths of time drivers in the study have been driving (held any type of licence) or spent as a Learner (held a Learner licence). Also, only studying the impact on young teenagers does not provide results of the impact of the program on older new drivers, those over 16 or, in some cases, 17. In addition, it makes it impossible to separate out and measure the impact of GLP on drivers in the Intermediate or unsupervised stage of the program.

9.3 Crash Reductions for All GLP drivers over a Two-Year Study Period.

When GLP driver crash rates were compared to Pre-GLP crash rates over a two-year period, BC saw a decrease of 22% (Year 2 Interim Evaluation, Appendix C) in the overall crash rate compared to a decrease of 31% for Ontario, 19% for Nova Scotia, 17% for Quebec (net decrease in the rate of victims killed or injured), and 7% for New Zealand (net decrease in hospitalizations of persons injured in car crashes). Other jurisdictions used different methods or limited their analysis to teens, and, therefore, results are not comparable. The following compares the evaluation methods and graduated licensing programs of the above four jurisdictions to BC's. For comparability, the results presented for BC are taken from the Year 2 Interim Report. Little information is available from other jurisdictions for a three year period.

Ontario Graduated Licensing System (GLS) reported a much larger decrease in crash rates for GLS drivers compared to pre-GLS drivers (Tasca and Boase, 1998) than BC (31% compared to 22%). This may be a result of the following differences in evaluation methods and program:

- Ontario was unable to determine when pre-GLS new drivers obtained their Learner licence. Ontario's pre-GLS cohort included only those new drivers who received their full privilege (G) licence in 1993. This excluded from the cohort anyone who received a Learner licence in 1993 but did not also obtain a full privilege licence in the same year. As the crash rate for Learners is much lower than for non-Learners, excluding some Learners from the pre-GLS cohort would likely overstate the decrease in crash rate for GLP drivers.

- The BC evaluation was able to create a Pre-GLP cohort that included all drivers who received their very first Learner licence over a one-year period between August 1996 to July 1997 which is comparable to the GLP cohort.

- Ontario GLS has a minimum 12-month Learner stage (may be reduced by four months upon completion of approved training) which is twice as long as the BC Learner stage of six months (may be reduced by three months upon completion of approved driver training). As the crash rate is much lower in the Learner stage, a longer Learner stage is expected to result in a larger decrease in crash rate over a two-year study period.

The 19% decrease in crash rate reported for **Nova Scotia Graduated Driver Licensing (GDL)** (Mayhew, Simpson and Groselliers, 1999), following the implementation of GDL, is similar to that reported by BC of 22%.

- Nova Scotia compared the crash rate of a sample of drivers who received their Learner licence in 1993 (pre-GDL cohort) and a sample of those who obtained a Learner licence in 1995 (their GDL cohort). Although the cohorts contained relatively small numbers of drivers (11,777 drivers in the pre-GDL cohort and 8,600 drivers in the GDL cohort), and the rate was based on crashes per 10,000 drivers rather than per 100 years of driving, the method and the results are comparable to BC's.

- Nova Scotia has a Learner stage that is the same as BC's (six months which may be reduced by three months upon completion of approved driver training); however their Intermediate stage is slightly different. Nova Scotia's "Newly Licensed Driver Phase" is a minimum of 2 years, there is a night-time driving restriction from midnight to 5 AM, and, in order to exit the program, a 6-hour defensive driving course must be completed. BC's Intermediate stage is a minimum of 18 months. It does not have a night-time restriction, but as the majority of driving takes place prior to midnight this will not likely impact the overall crash rate to any

great extent. The different exit requirement (must pass the Level 2 road test) of the BC program may not have a large impact on the crash rate of GLP new drivers as many drivers, at the time of the evaluation, were not eligible to take the test. Differences in exit requirements is not likely to affect an overall reduction in crashes during a two year study period when only a handful of drivers are eligible to exit the program.

In a recent update of the evaluation of the Nova Scotia GDL, Mayhew et al. (2002) reported that most of the collision reductions resulting from the introduction of the program occurred during the first year of the program, when most of the drivers were still in the supervised Learner stage.

The decrease in victims per 100,000 licence holders of 14% reported for the **Quebec Graduate Licensing System (GLS)** (Bouchard et al., 2000(?)) for injury and fatal crashes is lower than the decrease of 22% in the unadjusted crash rate for all crash severities, not just injuries and fatals reported by BC. The evaluation methods and graduated licensing programs are quite different for the two provinces.

- Quebec compares the victim rate in the two years before the reform to the two years after. The rate is calculated as the number of victims (passengers and drivers) injured or killed per 100,000 learner and probationary licence holders. Quebec reported a decrease of 13.6% in the rate of victims per 100,000 licence holders following GLS implementation compared to an increase of 3.5% in a control group of drivers under age 25 who were regular licence holders.

- Quebec has a 12-month Learner stage (may be reduced by four months upon completion of approved training) which is twice as long as the BC Learner stage (six months which may be reduced by three months upon completion of approved driver training). Quebec's two-year probationary stage has no exit requirement, unlike BC's Intermediate stage which requires drivers to pass an advanced road test in order to exit GLP. Quebec's probationary stage has no restrictions other than zero BAC. This is similar to BC's Intermediate stage which also has a zero BAC restriction and requires the Novice to display an "N" new driver sign.

- One would expect that Quebec would see a greater decrease over a two-year study period due to their longer Learner period (12 months vs. 6 months for BC) as the crash rate of new drivers is much lower in the Learner stage than the Intermediate stage.

A net decrease of 7% in hospitalizations for injuries incurred in car crashes reported by **New Zealand's Graduated Driver Licensing System (GDLS)** (Langley, Wagenaar and Begg, 1995) is lower than the decrease of 22% reported by BC for all car crashes.

- The evaluation of the New Zealand GDLS is quite different from the evaluation of BC's GLP. New Zealand used time series analysis rather than a before and after comparison of crash rates to determine the decrease. Data came from hospital records rather than crash data recorded extracted from the ICBC Crash Crime Contraventions system.

- The evaluation reported that hospilatizations for injuries incurred in car crashes declined the greatest (23%) for 15 to 19-year-olds after the GDL policy took effect. Hospitalizations for those 25 and over declined by 16%. The report made the assumption that the 16% decline for those 25 and over was not due to the GDL policy, but rather resulted from other effects, and that 15 to19-year-olds experienced the same other effects. The report attributes a decline of 7% (23%-16%) to the new GDL system.

- New Zealand's Learner period (six months in length – may be reduced by three months upon completion of approved driver training, no passengers in addition to a supervisor and 0.03 BAC) is similar to BC's. The low compliance reported for some of the key provisions of GDLS may be one of the reasons a larger decrease in crash rate was not realized by the New Zealand program.

9.4 Crash Reductions in the Novice Stage

Only Ontario looked at the crash rates of drivers in the unsupervised stage following the Learner stage. However their methods are different and the results not comparable to BC's.

Ontario reported a **decrease** in crash rate in the Intermediate stage for Novice (G2) drivers of 16% compared to an increase of 11% reported by BC.

- Ontario compared the crash rate of Novice (G2) drivers in the GLS cohort to the crash rate of all drivers (Learners and full privilege licence holders) in their pre-GLS cohort. As GLS was implemented April 1994 and the minimum Learner period is 12 months, G2 drivers in the GLS cohort would have driven a maximum of 21 months (unless they had completed driver training) compared to a maximum of 24 months for all drivers in the pre-GLS cohort. Less exposure for the GLS cohort is likely a strong contributing factor in the 16% reduction in crash rate reported for Ontario's Novice drivers.

- BC's evaluation uses a crash rate based on number of crashes per 100 person years of driving. This type of crash rate takes into account different amounts of followup for each driver in the cohort. Ontario used a crash rate based on the number of crashes per 10,000 drivers which does not take into account the amount of followup for each driver in the cohort.

9.5 Changes in Crash Rates for those taking Driver Training

Ontario and Nova Scotia are the only jurisdiction besides BC that have included an analysis of crashes for drivers who completed approved driver training.

Ontario reported a 44% increase in crashes for Novice drivers who completed approved driver training compared to those who did not. In Nova Scotia, Novice drivers who took driver education were reported to have a 20% higher crash rate during their first year of unsupervised driving.. Like BC, Ontario and Nova Scotia offered time incentive to drivers completed an approved driver education course. In Ontario, where the Learner stage is 12 months, drivers who completed driver education were eligible for a time discount of up to 4 months; in Nova Scotia, with its 6-month Learner stage, drivers could get a time discount of up to 3 months. This is the same provision that is available in BC. As reported in the Year 3 Evaluation, Novice drivers who completed the ICBC-approved course and submitted a DOC had crash rates during their first year of driving that were 26% higher than drivers who did not submit a DOC. This observed increase is consistent with those reported in both Ontario and Nova Scotia. In summarizing the results obtained in Nova Scotia, Mayhew and Simpson (2002) concluded that "the three-month 'time discount' offered for driver education provided no safety benefits" (p.1).

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