



## Crash risk associated with pace of progression through the Graduated Driver Licence Scheme.

### Purpose

This short report describes the key initial findings from analyses of the crash rates for persons who progress through the GDLS compared to those that do not. This paper is not intended to review the GDLS as this has been achieved elsewhere (Schiff Consulting, 2019). The basic premise is that New Zealand holds a sophisticated crash record in the form of CAS-II data and that analyses of these data can reveal the rates of crashes for those progressing through the graduated driver licence scheme (GDLS). The focus here is on the progression between the Restricted Licence and the Full Licence because this is where policy changes are being considered. However, where needed, and by extension the types of inquiry here can be applied to Learner Licences.

### Background

An elevated crash risk for learner licences was observed in the analysis of Death and Serious Injury accidents from 2009-2017 as represented in the Crash Analysis System (CAS). This effect was more acute in the Auckland conurbation. Multiple other factors were found to be negatively associated with the change in rates of crashes from 2013-2017 (including being a young driver, seat belt use, etc) or not related at all to the observed uptick in rates of Death and Serious Injury Crashes. Alcohol as a contributing factor was also significantly more likely in 2014-17 compared to the 2009-13 years (Walton et al., 2019).

### Methodology

The analyses here use Crash Records from 2009 -2019. Waka Kotahi provided an additional dataset of all DLICNOs (driver licence numbers), and the dates individuals progressed from Learner Licence (LL) to Restricted Licence (RL) to Full Licence (FL) (N= 809,163 persons). Not all progress. The length of time it takes for persons to progress through the GDLS is critical to the definitions used here.

The analysis first compares the time taken for individuals to progress through the GDLS to identify a 'normal progression'. Although there are minimum time periods in which it is possible to start and complete the requirements for a FL, the usual time indicated a level of engagement with driver training that by contrast defines those who are 'stuck' at a RL or operate on what is described as stale licences.

## Questions to be addressed

1. Does the full licence practical test reduce a driver's crash rate?
  - a. What is the usual time to achieve a FL?
  - b. What happens if a person is slow to get a FL?
2. Does the full licence practical test reduce the crash rate of a driver who is 25 and over?
3. Does the full licence practical test reduce the crash rate of a driver who is under 25?
4. Are people that do not progress a safety issue?
  - a. Can any safety issue reduce with time?
  - b. Do people who progress slower than normal always have worse safety outcomes?
5. Are people over 25 who do not progress a safety issue?
  - a. Can any safety issue reduce with age?
  - b. Do people who progress slower than normal always have worse safety outcomes?
6. Does taking the time-discount maintain, reduce or increase crash rates compared to those that don't take the time-discount?

## Definitions

For the comparisons in Table 1, this means the data considers drivers who obtained a LL after 01/01/2012 and before 1/04/2017 (N= 628,366 drivers). Table 2 considers those who enter the GDLS after 2009 and before the end of 2011 (N= 251,600 drivers).

### **What is a stale RL?**

A stale RL here means a person has time on a RL that is longer than the 85% of people who progress to achieve a FL. Analysis of the usual length of time from the date of obtaining a RL to obtaining a FL has an 85<sup>th</sup> percentile at 1013 days (2.8 years). The analysis excludes people who have recently obtained a RL (i.e., less than 2.8 years from the date of data extraction).

### **What is normal Progression?**

The definition of normal is derived from an examination data from 2012-2020. Used here, *normal* means a driver who at some point obtains a RL which they hold for less than 2.8 years and then obtain a FL (N= 288, 736 drivers). Within this group, N = 7743 persons have experienced a crash (Fatal, Serious and Minor) between 2009 – 2019, a rate of 268 per 10,000 persons. Most people (88%) progress through the GDLS before they are 25 years old. It is quite usual to expect over 25-year-olds to have a lower crash rate, the GDLS is designed with this understanding as the licensing restriction are meant to reduce the risks otherwise associated with the under 25-year-old age bracket and its recognised elevated crash rate.

### **What is a Slow RL?**

Some people progress slowly through a RL and eventually get a full licence but spend more than 2.8 years on their RL. These are defined as Slow RLs. They have a full licence but were in the top 15<sup>th</sup> percentile of time taken to do so. These people have a greater elevated risk of a crash compared to those who progress normally to a FL.

### **What is meant by Crash Rate?**

Crash rate is determined by matching to the DLICNO (Driver's Licence Number) represented in crashes recorded where the individual is the driver of a vehicle (i.e., not as a cyclist or pedestrian) and at fault, or partially at fault in the CAS-II data from 2009- 2019. The injury or fatality may have been to anyone involved in the crash; it is the crash severity that is considered. A very small portion of drivers (less than 1%) had more than one crash across the time period and in these circumstances only the first crash is considered.

At the time of data extraction, the 2020 year had not been finalised, and the 2021 is currently not available. There is always a lag in the data for traffic crash records and while the analyses might be influenced by trend data most analyses here are between-group comparisons that will be unaffected by the recognised limitations in these data. Additionally, the data avoids any implications of delays in progression, lower rates of driving and crash rates influenced by the COVID-19 pandemic.

For descriptive statistics (e.g., how many people appear as 'Stale RL') all available data are used. However, the CAS records are limited to events to the end of 2019. Clearly, those who hold stale licences by virtue of being on a RL for more than 2.8 years from, for example, mid 2019, will have a relatively narrow opportunity to be represented in the crash record. They may well crash in 2020 or 2021 but we will not represent this in the analyses presented below. This data limitation will have a minor influence on the comparison odds of a crash but may limit the interpretation of the following results.

### **What is used as the baseline?**

Table 1 indicates the crash rates for different categories of drivers. The baseline is often 'normal progression': the vast majority of persons who start a LL and progress steadily through to a FL, taking around 4 years in total. These may be further divided by age (under and over 25 years old) and more nuanced by limiting consideration to crashes at a particular stage of the GDLS. Table 2 makes similar comparisons but is restricted to the years 2009-2011.

A small caution is required when considering the results in Table 1. A comprehensive set of rates of crashes per 10,000 persons has been supplied for all crashes and for DSI crashes. The rate applies to a period of observation that varies between the sections of the table. All crashes between 2009-2019 is obviously larger than the set of crashes that could occur between 2012-2019 which is considered when restricting interest to those who started the LL after 2012. This creates the appearance that the rates in Table 2 that considers those prior to 2012 are much larger than those post 2012. Similarly, when considering just the time a person was on their RL there is a relatively narrow range of driving exposure, and thus lower absolute rates of crashes.

In each section a set of odds ratios provides a comparison, and these adjust for the exposures to be even so that the relative odds of having a crash are comparable. While the rates per 10,000 are sometimes useful, the odds ratios should be closely examined for drawing conclusions, and then only when it is understood that the exposure times should be the same for the groups being compared.

### **What are IONs and what is meant by them here?**

The final entry on Table 1 (Row 10) considers those who are ticketed for one or more offences against their licence conditions (around 28% of all persons progressing through the GDLS). These are compared to those who are not ticketed.

The offences considered are:

- 1) Drove Contrary to Conditions Of Driver License
- 2) Learner Driver Unaccompanied
- 3) Learner's Overseer Held Full Licence Less Than 2 Years
- 4) Learner Licence Failed to Display 'L' Plate
- 5) Restricted Driver Unaccompanied Between 10pm And 5am
- 6) Restricted Driver's Overseer Not Suitable Qualified
- 7) Restricted Driver Carried Unauthorised Passenger
- 8) Drove In Breach of Automatic Transmission Condition On Restricted Licence

The basic comparisons show very significant increases in the odds (up to eight times) of having a crash outcome for those who are ticketed for breaching the conditions of their licence compared to those that are not.

### **Other Considerations**

The material produced here responds to quite specific policy concerns. These analyses do not satisfy all the interesting and important concerns reviews and others might have in the broad area of the performance of New Zealand's GDLS. However, this is one example of linking three datasets together (CAS-II, IONs-issued, and Driver Licence Registry) to learn more about the outcomes of persons progressing to obtain a Driver's Licence. It is acknowledged that there may be useful insights comparing specific rates of crashes per year. Improvements might limit the sample to those who have had at least a year's driving on a FL to observe crash rates. These analyses do not fully examine the detail of when a person has a crash in their learner licence phase.

There may be advantage in further researching these data.

Table 1. The rates of crashes per 10,000 persons based on stage of progress through the New Zealand Graduated Driver Licence Scheme, considering those who start after 2012 and crashes occurring between 2012- 2019

	Question	Purpose	Category of Driver	Full Licence	N (2012-19)	Any crash	DSIs	Any crash Per 10,000	DSI per 10,000	Odds Ratio All Crashes	Odds Ratio DSI Crashes	Specifics
1	What is the crash rate for the 85% of people who progress “normally” through the system (i.e staying on their RL for < 2.8 years)?	Reference point	What is the crash rate for the 85% of people who progress “normally” through the system (i.e staying on their RL for < 2.8 years)?	Yes	210,708	7258	767	344	36	ref	ref	This is the crash rate for all people who got their LL after 2012 who progressed from their RL to FL in ≤ 2.8 years. The crashes could have happened at any time between 2012-2019 and they could have been on their LL, RL or FL.
1.2	What is the crash rate for the 85% of people who progress “normally” through the system (i.e. staying on their RL for < 2.8 years) for the time they have a RL?	Reference point	Normal Progression (LL-RL-FL) starting with LL after 2012 to 2018, crash occurs while on RL.	Yes	210,708	2030	260	96	12	ref	ref	This is the crash rate for all people who progressed from their RL to FL in ≤ 2.8 years (starting a LL on or after 2012). The crashes could occur between 2012 and 2019 while they are on their RL. (note the time period is compressed and should not be compared to 1 above).

1.3	What is the crash rate for the 85% of people who progress “normally” through the system (i.e. staying on their RL for < 2.8 years) for the time they have a FL?	Reference point	Normal (RL < 2.8 years), FL obtained – crash rate while on FL (LL obtained 2012 -2018)	Yes	210,708	4434	379	210	18	ref	ref	This is the crash rate for all people who progressed from their RL to FL in ≤ 2.8 years (starting a LL on or after 2012). The crashes could occur between 2013 and 2019 while they are on their FL. This is the base rate of crashes and DSIs following a normal progression through the GDLS.
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	Question	Purpose	Category of Driver	Full Licence	N (2012-19)	Any crash	DSIs	Any crash Per 10,000	DSI per 10,000	Odds Ratio All Crashes	Odds Ratio DSI Crashes	Specifics
<b>Normal progression but under 25 years old</b>												
2.2	A reference for crash rate while on full licence for normal progressors under 25-year-olds.	Reference point who crash after they've obtained a FL	Normal Progression (LL-RL-FL) starting with LL after 2012 to 2018 but crash occurs on FL and age at FL is under 25 years.	Yes	185,140	3995	354	216	19	ref	ref	Not much different from 1.3 because most people will achieve FL by the time they are 25 years old.
<b>Normal but Aged 25 years and older</b>												

3	What is the crash rate for the 85% of 25 and overs who progress “normally” through the system staying on their RL for <=2.8 years?	Reference point for 25 and overs	Normal Progression (LL-RL-FL) for those aged 25 and over LL obtained between 2012 – 2018	Yes	25568	761	64	298	25	0.86 LCL 0.80 - UCL 0.93 <.001	0.61 LCL 0.46 - UCL .78 p.< .0001	This is the crash rate for people 25 and over who progressed from their RL to FL in ≤2.8 years. The crashes could have happened at any time between 2012 and 2019 and they could have been on their L, R or F. Odds ratio compared to rates in row 1.
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	Question	Purpose	Category of Driver	Full Licence	N (2012-19)	Any crash	DSIs	Any crash Per 10,000	DSI per 10,000	Odds Ratio All Crashes	Odds Ratio DSI Crashes	Specifics
<b>Stale Restricted</b>												
4	How does the crash rate for people who do not progress normally and remain on their RL compare to the crash rate for those who progress normally?	Is licence pooling a safety issue?	Stale RL (RL > 2.8 years), no FL Obtains LL between 2012 – 2016 Crashes between 2012 and 2019	No	60781	2960	388	487	64	1.41 LCL 1.35 – UCL 1.48 p.< .0001	1.55 LCL 1.37- UCL 1.75 P. <.0001	This is the crash rate of all people who have not progressed from their RL to FL and has been on their RL >2.8 years. The crashes could have happened at any time between 2012-2019 and they could have been on their LL or RL licence. Comparison is made to row 1.

4.2	Stale Restricted after 2012	Do those older than 25 years who have a Stale RL improve compared to those who progress through normally.	Obtains LL between 2012 – 2016 Crashes between 2013 and 2019 after they have obtained a RL, never obtains FL and is over 25 years at the time of obtaining RL	No	10381	254	30	245	29	2.29 LCL 1.89 – UCL 2.87 p.<.0001	2.19 LCL 1.26 UCL 3.8 p. <0.004	Referenced against 4.3 (below).  Crashes on RL only
4.3	Normal Reference for 4.2		Obtains LL between 2012 – 2016 Crashes between 2013 and 2019 after they have obtained a RL, obtains a FL within 2.8 years of getting RL and is over 25 years at the time of obtaining RL	Yes	20478	433	27	211	13	Ref	Ref	Crashes on RL and FL
<b>Does the FL contribute to improving safety? Crash Risk Post RL for Normal Progressors, those that stay on a RL, for over and under 25-year-olds.</b>												
<b>Over 25-year-olds</b>												
5	Does obtaining the FL make much difference or does mere time on the RL reduce the crash rate of drivers?	Do those over 25 really need a FL test?	Normal progression for an over 25-year-old (at the time they get their RL), after 2012, getting their FL within 2.8 years. Crash risk for the period 2.8 years post RL?	Yes	25787	499	33	194	13	ref	ref	Note that the sample is larger than similar comparisons above because the age cut point is the time at which they get their RL meaning they may have obtained a LL prior to 2012. Crash rate is for the up to 5 year period after 2.8 years since first obtaining their RL had passed. Because these are normal progressors, crashes will be while on FL.



5.1	Does obtaining the FL make much difference or does mere time on the RL reduce the crash rate of drivers?	Do those over 25 really need a FL test?	Stale RL progression for an over 25-year-old (at the time they get their RL), after 2012, not getting their FL within 2.8 years. Crash risk for the period 2.8 years post RL?	No	15497	377	43	243	28	1.25 LCL 1.1– UCL 1.44 p.< .001	2.17 LCL 1.35 – UCL 3.5 p.< .0001	Comparison to those that progress normally, i.e Line 5) Crash rate is for the up to 5 year period after 2.8 years since first obtaining their RL had passed. Because these are stale RL, crashes will be while on RL.
5.2	Slow to FL	Do those over 25 really need a FL test?	Slow RL progression for an over 25-year-old (at the time they get their RL), after 2012, not getting their FL within 2.8 years. Crash risk for the period 2.8 years post RL?	Yes	5902	124	10	210	17	1.11 LCL 0.9 UCL 1.35 p. <.3 NS	1.35 LCL 0.59 – UCL 2.80 p.<.43 NS	Comparison to 5 Note that it is NS. Crash rate is for the up to 5 year period after 2.8 years since first obtaining their RL had passed. Because these are slow RL, crashes will be while on RL and FL.
<b>Under 25-year-olds</b>												
5.3	Does the FL effect that is observed above hold for those under 25 years (as these are vastly majority of drivers progressing through the GDLS).		Normal progression for an under 25-year-old (at the time they get their RL), after 2012, getting their FL within 2.8 years. Crash risk for the up to 5 years driving post RL +2.8 years?	Yes	219103	6638	723	303	33	ref	ref	Ref Note that the sample is larger than similar comparisons above because the age cut point is the time at which they get their RL meaning they may have obtained a LL prior to 2012. Crash rate is for the up to 5 year period after 2.8 years since first obtaining their RL had passed. Because these are normal progressors, crashes will be while on FL.
5.4	Stale RL		Stale RL progression for an under 25-year-old (at the time they get their RL), after 2012, not getting their FL within 2.8 years. Crash risk for the up to 5	No	61641	2524	329	409	53	1.35 LCL 1.29 UCL 1.42 p.<.0001	1.18 LCL 1.03 UCL 1.35 p.< .013	Comparison to 5.3 Crash rate is for the up to 5 year period after 2.8 years since first obtaining their RL had passed. Because these are stale RL, crashes will be while on RL.

			years driving post RL +2.8 years?									
5.5	Slow to FL		Slow RL progression for an under 25-year-old (at the time they get their RL), after 2012, finally getting their FL after 2.8 years. Crash risk for the up to 5 years driving post RL +2.8 years?	Yes	46672	1805	251	387	53	1.28 LCL 1.21 -UCL 1.35 p.<.0001	1.63 LCL 1.41 UCL 1.88 p.<.0001	Comparison to 5.3 Crash rate is for the up to 5 year period after 2.8 years since first obtaining their RL had passed. Because these are slow RL, crashes will be while on RL and FL.

	Question	Purpose	Category of Driver	Full Licence	N (2012-19)	Any crash	DSIs	Any crash Per 10,000	DSI per 10,000	Odds Ratio All Crashes	Odds Ratio DSI Crashes	Specifics
<b>Super Long Stale (on RL for greater than 5 years)</b>												
6	What is the crash rate while on a RL for those persons who stay on a RL compared to those who progress normally.	What happens to those who are on RL for a very long time?	Stale RL (RL > 2.8 years), no FL 2009 – 2019	No	9469	278	33	294	34	3.05 LCL 2.8 – UCL 3.5 p.<.0001	2.82 LCL 1.9 – UCL 4.06 p.<.0001	Compared to 1.2 above. Do note that this group has twice as long on their RL thus increased exposure. Starting on LL on or after 2009, stayed on RL for >2.8 years. Crashed between 2009 and 2019 while on LL or RL.

Slow to Progress												
7	How does the crash rate for those who progress slower than normal but eventually get their FL compare to the crash rate for those on a normal progression (while they are on their RL)? Is this different to the crash rate for those who remain on their RL?	Are all people who take longer than the norm to progress a safety issue?	Slow RL (RL > 2.8 years), FL obtained – crash rate while on RL  Obtains LL between 2012 – 2016 Crashes between 2012 and 2019	Yes	34994	1653	204	472	58	1.37 LCL 1.29- UCL 1.45 p.< .0001	1.41 LCL 1.20 - UCL 1.65 p.< .0001	This is the crash rate of all people who have progressed from their RL to FL in >2.8 years. The crashes could have happened at any time between 2012-2019 while they were on their R licence. Comparison to row 1.
7.2	How does the crash rate for those who progress slower than normal but eventually get their FL compared to the crash rate for those on a normal progression (while they are on their FL)?	Does the full licence test improve safety outcomes for those who take longer than the norm to progress?	Slow RL (RL > 2.8 years), FL obtained – crash rate while on FL	Yes	75876	2024	233	266	31	1.27 LCL 1.20 - UCL 1.34 p. < .0001	1.71 LCL 1.44 – UCL 2.02 p.<.0001	These are the crash rate of all people who have progressed from their RL to FL in >2.8 years. Crashes occur once the FL has been obtained. This means crashes can occur any time between 2015 and 2019 for the slow progressors.  Comparison to row 1.3
<b>Does it matter if the Stale Restricted Licence is under 25 or over 25-years-old?</b>												

8	Is the crash rate for 25 and overs who have stale restricted licences, higher than the crash rate for under 25s who have stale restricted licences?	Is the crash rate for 25 and overs different to the crash rate for under 25s in our data? If so, how?	Stale RL and crash at age under 25 years compared to all Stale RL over 25 years.  Obtains LL between 2012 – 2016 Crashes between 2012 and 2019 (Just 2012 -2019)	No	Stale Under 25-year-olds at RL 50,309  Stale, Older than 25 at RL 10471	2616  344	344  44	519  328	68  42	0.63 LCL 0.56 - UCL .70 p. < .0001	0.61 LCL 0.43 - UCL .84 p. < .001	This is the crash rate for people who were 25 and over on their RL (meaning the date of their RL ) for >2.8 years. This is the crash rate of all people who have not progressed from their RL to FL and has been on their RL >2.8 years. The crashes could have happened at any time between 2012-2019 and they could have been on their LL or RL at the time of the crash. Comparison is made to each other (over 25s compared to under 25s). (Divides across row 4)
<b>Discounted for under 25-year-olds</b>												
9.1	What is the crash rate while on the FL for those who progress normally between RL and FL (greater than 18 month but less than 2.8 years) and are under 25 years.	Reference	Those who have a crash who have progressed normally without the time discount – FL crash rate	Yes	91278	2121	158	232	17	ref	ref	This is the crash rate for people under 25 on their RL who progressed normally to a FL without taking a time discount - 18 months to 2.8 years. This is their crash rate on their full licence. Crashes could occur between 2014 and 2019.
9.2	What is the crash rate for those who obtain a discount on time and progress early between RL and FL (less than 18 month and are under 25 years)?		Those who have a crash who have progressed to a FL 12-18 months after getting their RL.	Yes	93862	1874	192	200	21	0.86 LCL =0.81 UCL = 0.91 p. <.0001	1.18 LCL 0.95 UCL 1.47 p. < .12 NS	This is the crash rate for people under 25 who received a time-discount on their RL and progressed to a FL in 12-18 months. This is their crash rate on their full licence. This is compared against those who progress normally (9.1). Note that he DSI odds ratio is not significant. Crashes occur between mid-2013 and 2019.

The relationship of Crash outcomes to IONs for breach of licence conditions

IONS and Crash Outcomes	Base rates		Any DSI Crash at any Stage	Fatal	Crash While on RL	Crash while on LL		
10 How many person have crashes with a high number (say more than 1) GDLS-related offences	455,135 person have no IONS for GDLS-related offending and 1231 have a DSI crash.  179803 persons have an ION for GDLS-related offences and 1992 have a DSI crash.							
			<b>IONS</b> <b>No ION</b>					
		<b>Fatal</b>	<b>121</b> <b>59</b>	OR = 4.09 LCL = 3.8, UCL = 4.4 p. < .0001	OR = 5.2 LCL = 3.77, UCL = 7.2 p. < .0001	OR = 8.33 LCL = 7.18, UCL = 9.95 p. < .0001	OR = 8.56, LCL = 7.39, UCL = 9.95 p. < .0001	OR = odds of having a crash when having received one or more ION for a Licence-Related offence, has been given compared to the odds of having a crash if they have no IONs.
		<b>Serious</b>	<b>1871</b> <b>1172</b>					
		<b>Minor</b>	<b>8365</b> <b>6175</b>					
		<b>Non-Injury</b>	<b>3883</b> <b>3324</b>					

**Analyses for 2009 to 2011**

Table 2 presents the data restricted to licence progression start dates within 2009-2011. These analyses are useful for examining whether changes to the GDLS in 2012 have had a substantial impact on the crash rates. However, for many analyses the date range for crashes remains the expanded opportunity of 2009 -2019. While the odds ratios are directly comparable to the associated analyses in Table 1, the rates of crashes per 10,000 are not directly comparable between the tables. For clarity, it is wrong to draw a meaningful conclusion from the fact that the comparable rates per 10,000 before 2012 are higher than those after (i.e., 2012 -19). This is true because there is more driving exposure for the pre-2012 group than those post-2012. The purpose of

Table 2 is to illustrate that the findings drawn from Table 1 would be also found prior to 2012. That is, those who are Stale RL or Slow RL have elevated crash rates compared to their contemporaries who progress through the GDLS normally.

*Table 2: The crash rates associated with Normal, Stale, Slow Progression through the GDLS considering person who started in 2009-2011.*

	Question	Purpose	Category of Driver	Full Licence	N (2012-19)	Any crash	DSIs	Any crashes Rate Per 10,000	DSI per 10,000	Odds Ratio All Crashes	Odds Ratio DSI Crashes	Specifics
1.1	What is the crash rate for the 85% of people who progress “normally” through the system (i.e., staying on their RL for < 2.8 years)?	Reference point	Normal Progression (LL-RL-FL) starting with LL after 2009 to 2011	Yes	78,028	3798	543	487	70	ref	ref	This is the crash rate for all people who got their LL who progressed from their RL to FL in ≤ 2.8 years. The crashes could have happened at any time between 2009-2019 and they could have been on their LL, RL or FL. Note there is a longer time in which to crash).
2.1	What is the crash rate for the 85% of people who progress “normally” through the system (i.e. staying on their RL for < 2.8 years) who are under 25 years old at the time of obtaining the FL	Reference for those under 25 years who progress normally	Normal Progression (LL-RL-FL) starting with LL after 2009 to 2011	Yes	66,460	3276	474	492	71	1.01 LCL 0.93– UCL 1.05 p.< .61 NS	1.02 LCL 0.90– UCL 1.164 p.< .7 NS	The reference is to Table 1, line 1 above. There is no difference in crash rates compared to the overall rate of those progressing through normally, reflecting the fact that 85% of all person progress through normally by the time they’re 25 years old.

3.1	What is the crash rate for the 85% of 25 and overs who progress “normally” through the system staying on their RL for <=2.8 years?	Reference point for 25 and overs	Normal Progression (LL-RL-FL) for those aged 25 and over 2009 – 2011	Yes	11564	522	69	451	60	0.93 LCL 0.84- UCL 1.02 p.< 0.11 NS	0.85 LCL 0.65 - UCL 1.1 p.< .25 NS	This is the crash rate for people 25 and over who progressed from their RL to FL in ≤2.8 years. The crashes could have happened at any time between 2009 and 2019 and they could have been on their L, R or F. Odds ration compared to rates in row 1.2.
4.1	How does the crash rate for people who do not progress normally and remain on their RL compare to the crash rate for those who progress normally?	Is licence pooling a safety issue?	Stale RL (RL > 2.8 years), no FL 2009 – 2011	No	26574	1381	238	520	90	1.07 LCL 1.0 – UCL 1.13 p.< .04	1.29 LCL 1.1- UCL 1.5 P. <.0014	This is the crash rate of all people who have not progressed from their RL to FL and has been on their RL >2.8 years. The crashes could have happened at any time between 2009-2019 and they could have been on their LL or RL licence. Comparison is made to row 1.1
7.1	How does the crash rate for those who progress slower than normal but eventually get their FL compare to the crash rate for those on a normal progression (while they are on their RL)? Is this different to the crash rate for those who remain on their RL?	Are all people who take longer than the norm to progress a safety issue?	Slow RL (RL > 2.8 years), FL obtained – crash rate while on RL 2009 – 2011	Yes	40882	2348	356	574	87	1.18 LCL 1.12 - UCL 1.24 p.< .0001	1.25 LCL 1.09 - UCL 1.43 p.< .01	This is the crash rate of all people who have progressed from their RL to FL in >2.8 years. The crashes could have happened at any time between 2009-2011 while they were on their R licence. Comparison to row 1.1.
9.2	What is the crash rate for those who obtain a discount on time and progress early between RL and FL (less than 18 month and are under 25 years)?	Refenced against 2.1.	Those who have a crash who have progressed to a FL within a year from the date of obtaining a RL (Under 25 before 2012 and after 2009 )	Yes	1340	92	10	686	74	1.4 LCL 1.11– UCL 1.73 p.<.004	1.05 LCL 0.50 – UCL 1.95 p. <.87 NS	Now referenced against 2.1 (very little change to the previous comparison, 1.1). Now referenced against 2.1.

## Discussion

### **Does the full licence practical test reduce a driver's crash rate?**

All other things being equal, those that progress through the GDLS normally to obtain a FL are found to have lower crash rates for all crashes or DSIs compared to those that remain on a RL and never get to the FL (see Table 1 section 4), and those who are slow to get their FL (see table 1 section 7). This remains true whether the comparison is to the time they are on their RL or when they have achieved a FL (see for example, comparison Table 1, 7.2). Those that normally progress through the GDLS are usually the drivers with the lowest crash risk. The elevated rates for other categories of drivers are not trivial, they are at times double the expected rates for those who progressed normally.

Such findings from Table 1 derive from a comprehensive set of data, considering all data that are available. However, it can be argued that these broad effects could be coincidental to the GDLS, or largely due to sampling biases from framing effects. A counter argument can be made that those with better commitment to obtaining a licence (normal progressors) are simply better drivers; those that take a long time are always poorer drivers and no adjustment to the GDLS would make a difference. In addition, the broad findings do not always distinguish when the person has their crash. So, the observations that those who progress normally have a crash rate less than those that are slower, or less than those that hold a stale RL, might be because the those that are slow or never get around to getting a FL have an elevated crash risk when they started their LL, at the outset of their driving experience. If this were true, then all drivers would improve over time to overcome the initial differentiation in elevated crash. Thus, changes to the FL component of the GDLS would have no effect on crash outcomes.

Such a complex argument lies at the heart of policy concerns. They are even further complicated by the knowledge that there is a known reduction in crash risk for persons over the age of 25 years. So, whether a person is over or under 25 years may mitigate (technically *mask* or *suppress*) any elevated risk associated with being slow or failing to obtain a FL.

Thus, more direct comparisons are required to tease out the comparisons between those that are slow, stale and normal.

### **Does the full licence practical test reduce the crash rate of a driver who is 25 and over?**

The comparisons in section 5.0 - 5.1 demonstrate that the crash rate for those on a stale restricted licence are elevated for the up to five years after 2.8 years has passed since they obtained their RL (to remove the effects of early driving experience). This is true whether they are under or over 25 years old (see section 5.3 - 5.4). The table below shows that the odds of having a DSI are twice (or more) for those that do not progress to the FL compared to those that do. The odds of having any sort of crash are less elevated (around 25% higher for those that do not progress compared to those that do).



*Table Extract (sections 5.0 -5.1) Crash rates for those older than 25 years who progress through normally (line 5) or who remain on their RL (5.1) for the five years after they obtain a RL.*

		FL?	N	Number who Crash	Death or Serious Injury crash	Rate of Crashes per 10,000	DSI Rate per 10,00	Odds of crash compared to 'Normal Progression'	Odds of DSI crash compared to 'Normal Progression'
5	Normal progression for an over 25-year-old (at the time they get their RL), after 2012, getting their FL within 2.8 years. Crash risk for the 5 years driving post RL+2.8 years?	Yes	25787	499	33	194	13	ref	ref
5.1	Stale RL progression for an over 25-year-old (at the time they get their RL), after 2012, not getting their FL within 2.8 years. Crash risk for the 5 years driving post RL+2.8 years?	No	15497	377	43	243	28	1.25 LCL 1.1– UCL 1.44 p.< .001	2.17 LCL 1.35 – UCL 3.5 p.< .0001

**What about the same comparisons for slow to obtain FL?**

*Table Extract (section 5.2) Crash rates for those older than 25 years who progress through slowly (taking more than 2.8 years on the RL) compared to normal progression, for the five years after they obtain a RL*

		FL?	N	Number who Crash	Death or Serious Injury crash	Rate of Crashes per 10,000	DSI Rate per 10,00	Odds of crash compared to 'Normal Progression'	Odds of DSI crash compared to 'Normal Progression'
5.2	Stale RL progression for an over 25-year-old (at the time they get their RL), after 2012, not getting their FL within 2.8 years. Crash risk for the 5 years driving post RL+2.8 years?	Yes	5902	124	10	210	17	1.11 LCL 0.9 - UCL 1.35 p. <.3 NS	1.35 LCL 0.59 - UCL 2.80 p.<.43 NS

The finding shows that there is no significant difference for those over 25 years old who take longer than usual to obtain their FL (slow progression). Note that this group is relatively small (N= 5902) and that the reasons why people take a long time to progress are often complicated by such things as living overseas and not completing the FL until they return to live in New Zealand.

## Does the full licence practical test reduce the crash rate of a driver who is under 25?

Table Extract (section 5.3 -5.5) Crash rates for those younger than 25 years who progress through slowly (5.5) or stay on their RL (5.4) compared to normal progression, for the five years after they obtain a RL.

		FL?	N	Number who Crash	Death or Serious Injury crash	Rate of Crashes per 10,000	DSI Rate per 10,00	Odds of crash compared to 'Normal Progression'	Odds of DSI crash compared to 'Normal Progression'
5.3	Normal progression for an under 25-year-old (at the time they get their RL), after 2012, getting their FL within 2.8 years. Crash risk for the 5 years driving post RL+2.8 years?	Yes	219103	6638	723	303	33	ref	ref
5.4	Stale RL progression for an under 25-year-old (at the time they get their RL), after 2012, not getting their FL. Crash risk for the 5 years driving post RL+2.8 years?	No	61641	2524	329	409	53	1.35 LCL 1.29 UCL 1.42 p.<.0001	1.18 LCL 1.03 UCL 1.35 p.<.013
5.5	Slow RL progression for an under 25-year-old (at the time they get their RL), after 2012, finally getting their FL after 2.8 years. Crash risk for the 5 years driving post RL +2.8 years?	Yes	46672	1805	251	387	53	1.28 LCL 1.21 – UCL 1.35 p.<.0001	1.63 LCL 1.41 UCL 1.88 p. <.0001

In contrast with those over 25-years-old, those under 25-years-old who are slow to obtain their FL have elevated rates of crashes and increased odds of a death or serious injury accident (section 5.5). Like those over 25, the under 25's also have elevated rates when they are on a stale licence (section 5.4). The rates are elevated whether being Stale or slow to get FL. It is difficult to attribute a reason why Slow Progressors who are under 25 years old have a higher crash rate than those who are Stale and under 25 years old. There are likely to be qualitative differences between the constitution of these groups, and we simply do not have details of whether they differ in important metrics like the number of failed attempts a person makes to obtain the FL. Progressing normally is the best predictor of a lower crash rate when under 25 years old.

### Are people that do not progress a safety issue?

The safety risk for being slow to progress or never achieving a full licence only appears to reduce in the small subset of over 25-year-olds who eventually obtain a FL (i.e classified as slow FL in these analyses). Without knowing more about why these people take so long to obtain their FL it is difficult to assess the finding. It could be because these people fail on their first attempt at a FL and spend an undue amount of time on the RL. It could be because these people spend time away from driving or drive overseas on a different licence. What is apparent is that those who are similarly classified

and under 25 years do not obtain the same benefit. In general, people who do not progress to a FL maintain increased risks of crashes, and increased risk of crashes involving a death or serious injury.

**Does taking the time-discount maintain, reduce or improve crash rates compared to those that don't take the time-discount?**

The time discount is considered only for those under 25 years old as it is rarely used by persons over 25 years old. The results are mixed.

*Table Extract (sections 9.1 and 9.2) Crash rates for those younger than 25 years who progress to a FL within a year of having held a RL) compared to normal progression to a FL for those under 25 years old. .*

		FL?	N	Number who Crash	Death or Serious Injury crash	Rate of Crashes per 10,000	DSI Rate per 10,00	Odds of crash compared to 'Normal Progression'	Odds of DSI crash compared to 'Normal Progression'
9.1	Those under 25 years old who have a crash who have progressed normally without the time discount	Yes	91278	2121	158	232	17	ref	ref
9.2	Those under 25 years old who have a crash who have progressed to a FL in less than 18 months of getting their RL.	Yes	93862	1874	192	200	21	0.86 LCL =0.81 UCL = 0.91 p. <.0001	1.18 LCL 0.95 UCL 1.47 p. < .12 NS

The time discount appears to have a significant impact on being involved in any sort of crash but no effect on the likelihood of being involved in serious crash (DSI) while on a FL. This effect should be considered against the background that those who gain a time discount were significantly less likely to be involved in a DSI while on their RL or LL (OR = 0.52, LCL 0.42 -UCL 0.66). Although complicated (because the time discount imbalances the exposure opportunity for a clean comparison while on the RL) the time discount achieved through Advanced Driver Training does not have a positive effect on reducing involvement in a DSI. The advantage of the Advanced Driver Training, if there is one, is at the non-serious/minor crashes, though this effect also was present in the driver training group before the FL is obtained.

**Limitations**

The differentiation of normal progression from those who take an unusually long time would be further enhanced by indicators of 'engagement with the GDLS' such as whether persons on stale RL have attempted a FL, how many times a person has failed a test.

Travel behaviours and true exposure rates (how much driving a person does) are not available but would significantly help to further differentiate those who would benefit from changes in policy or operational practice.

It is exceptionally important to note that the reasons a person is delayed in progressing through to obtaining a FL are not apparent in these analyses. The prerequisite for any such inquiry is a

recognition that a delay in progression through the GDLS does increase the crash rates for those affected. However, it would be especially valuable to understand who is most likely to end up spending more time on a RL (whether this is concentrated within certain demographics, regions or other socio-economic factors).

## Further Opportunities,

We might better understand any differential impact of the GDLS on crash outcomes if we had further details of the persons beyond the dates of progression through to achieving a full driver's licence. For example, it may be important to understand whether the impact of the GDLS is greater in urban vs rural locations, Māori compared with pakeha, and males compared with females.

The dramatic increase in the odds of crash rates in the concentrations of persons who are ticketed for breach of a licence-conditions-related-offences could be further understood by examining the number of tickets a driver has, when those tickets were issued and the types of breaches that relate to crash outcomes. These sorts of analyses would be further enhanced by knowing the other sorts of traffic-related offending a person might be involved with (e.g., speeding tickets).

## Conclusions

Those who engage with the system of the GDLS are the best performing drivers. Those that do not progress to obtaining a FL from the RL have an elevated crash risk. This elevated risk is relieved by age (and presumably experience) but it is not eliminated. Those who progress slowly also present with an elevated crash risk. Obtaining a discount in time to obtain a FL appears to remove the advantage previously observed in the samples.

Further effort to understand why people fall into the categories of being 'slower to obtain a FL' and 'Stale RL' is important. This could be easily achieved by cross matching the records of attempts to pass the FL with the likelihood of being in the category.

Additionally, the very significant impact of breaching licence conditions should be considered when trying to understand the benefits of changes to the GDLS as a far greater effect on the observed risk to drivers is predicted by the record of IONS than that of the time to achieve each step in the GDLS.

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## References

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