Abstract
This report provides the results of a review of literature examining the effectiveness of different components of graduated driver licensing (GDL).

Components examined included: minimum learner age, minimum learner period, minimum learner supervised driving hours, supervisory driver requirements, formal education requirements, licence tests, minimum provisional age, minimum provisional period, night driving restriction, peer passenger restriction, blood alcohol concentration limit, mobile phone or other technology restriction, vehicle power restriction and specific sanctions for speed, alcohol or other offences.

The project considered whether there was evidence that the component addresses a contributing factor to young driver crashes and/or injuries, and is effective in reducing young driver crashes and/or injuries.

The most well evaluated components, and therefore having the most examples of quantified benefits in terms of crash and/or injury reductions, were a minimum learner age of 16 years, a minimum learner period of 12 months, minimum provisional age greater than 16 years (with increasing benefits with increasing age), night driving restrictions, peer passenger restrictions and a zero BAC limit.

Much of the literature originated from North America, which differs to Australasia in both GDL and enforcement practices. Jurisdictions should continue to monitor GDL research, but also evaluate their own data to the extent possible to ensure the appropriateness of each GDL component to their jurisdiction.

Keywords
graduated driver licensing, young drivers, review of evidence, Australasia

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• provide expert technical input to national policy development on road and road transport issues
• promote improved practice and capability by road agencies
• promote consistency in road and road agency operations.

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• Roads Corporation Victoria
• Department of Transport and Main Roads Queensland
• Main Roads Western Australia
• Department of Planning, Transport and Infrastructure South Australia
• Department of State Growth Tasmania
• Department of Transport Northern Territory
• Territory and Municipal Services Directorate, Australian Capital Territory
• Commonwealth Department of Infrastructure and Regional Development
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• New Zealand Transport Agency.

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This report has been prepared for Austroads as part of its work to promote improved Australian and New Zealand transport outcomes by providing expert technical input on road and road transport issues.

Individual road agencies will determine their response to this report following consideration of their legislative or administrative arrangements, available funding, as well as local circumstances and priorities.

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Summary

Background

Austroads commissioned the authors to review the evidence on the effectiveness of different components of graduated licensing schemes for car drivers in order to inform licensing policy in Australia and New Zealand. The project scope was to review available literature on graduated driver licensing (GDL) and did not include the collation and analysis of data from each Australasian jurisdiction. The three main research questions addressed for each component were:

1. Is there research evidence that the GDL component addresses a contributing factor to young driver crashes and/or injuries?
2. Is there evaluation evidence that the GDL component is effective in reducing young driver crashes and/or injuries?
3. What is the potential (quantified) impact of the GDL component on young driver crashes and/or injuries?

These questions were addressed and other considerations identified for policymakers to explore in relation to their own jurisdiction conditions and capabilities, rather than to make specific recommendations applicable to all jurisdictions.

Methods

The authors initially drew from their multiple and extensive reviews of the GDL literature over the past decade with attention to identifying evaluation research with quantified outcomes. Electronic database searches were also conducted to identify more recent literature from Australasian jurisdictions. In addition, Austroads members were requested to provide any internal, unpublished evaluations. The scope was research arising from jurisdictions in Australasia, North America and high income countries in Europe. A summary of the evidence available in relation to each of the three main research questions for each GDL component was tabulated.

Results and Discussion

The results are summarised in the table on the following page. Overall, evidence that each component addressed an important contributing factor to young driver crashes and/or injuries was found for all factors, but not all components had been evaluated as part of GDL models or in relation to crashes, or only limited evaluations had been conducted.

The most well evaluated components, and therefore having the most examples of quantified benefits in terms of crash and/or injury reductions, were:

- a minimum learner age of 16 years
- a minimum learner period of 12 months
- minimum provisional [age greater than 16 years (with increasing benefits with increasing age)]

1 For clarity, we use the term ‘provisional’ (as utilised in the Project Brief) to refer to any licence or stage between the learner stage/s and the full licence stage; also known as ‘provisionary’ in some Australasian jurisdictions or as ‘intermediate’ in North America. Where no such licence stage exists, this is referred to as the first period of ‘unsupervised’ or ‘independent’ driving. Likewise we note our use of ‘full licence’ or ‘full privilege licence’ to refer to the final stage also identified in the literature as an ‘open’ or ‘unrestricted’ licence.
• night driving restrictions,
• peer passenger restrictions and
• a zero blood alcohol concentration (BAC) limit.

There was some evidence on the effectiveness of setting a high number of supervised driving hours for learners (80-120 hours), and including hazard perception tests and exit tests in GDL models, but not on when was the best stage to introduce the hazard perception tests.

Emerging research suggested education programs to improve cognitive skill deficits, to build resilience and to involve parents had potential to reduce crashes but had not yet been adequately evaluated, while those focused on improving knowledge, awareness and/or attitudes were not effective and those reducing the length of the learner period or providing skid training were counterproductive.

There was no evaluation available in order to determine the optimal requirements for supervisory drivers, optimal length of the provisional period, or impact of introducing restrictions on mobile phones or other technology; nor for a range of specific measures to address speeding, alcohol and other offences. Vehicle power restriction evaluation suggested the impact would be limited but primarily due to limited ownership of high performance vehicles by young drivers.

It is important to distinguish in the evaluation of GDL components between negative, neutral, or inconclusive findings versus the absence of any evaluation or limited evaluation (second summary column in the table). The latter cannot be deemed to lack effectiveness or to suggest the component should not be introduced; particularly if there is clear evidence that the component addresses an important risk factor (first summary column). Therefore, a lack of evaluation and entry of ‘unknown’ impact should not be interpreted as a recommendation not to include that GDL component. Rather, more evaluation is needed to quantify the expected benefits.

### Summary of the research evidence on graduated driver licensing components

<table>
<thead>
<tr>
<th>GDL Component</th>
<th>Evidence component addresses contributing factor to young driver crashes/injuries</th>
<th>Evidence introducing component reduces young driver crashes/injuries</th>
<th>Examples of potential impact of introducing component on young driver crashes/injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum learner age</td>
<td>Crash evaluations plus neurobiological development research identify young age as risk factor</td>
<td>Crash, fatal crash and insurance claims research support minimum age 16</td>
<td>Age 16: 13% reduction in fatal crashes of 15-17-year-olds compared to min 15 years; 15% reduction in crashes of P drivers compared to min 17½ years</td>
</tr>
<tr>
<td>Minimum learner period</td>
<td>Sufficient time needed to maximise depth and breadth of experience before Ps; also setting minimum can increase P age and reduce risk this way, not only due to improved experience</td>
<td>Greater crash, casualty crash reductions for 12 months than 6 months; 24 months can further reduce if additional supervised driving undertaken</td>
<td>12 months: 13% reduction in fatal crashes of 15-17-year-olds; 9% reduction in collision claims of 16-year-olds; min 26% reduction in fatal crashes of 16-year-olds, 17% of 17-year-olds</td>
</tr>
<tr>
<td>Minimum learner supervised driving hours</td>
<td>Few hours results in less varied and less complex experience likely required to protect against crashes; experience driving at night or in darkness can be particularly limited</td>
<td>Some evidence (mainly modelling-based) that more hours associated with improved crash outcomes, with optimal experience calculated as 5,000 to 7,000km (likely equating to about 80-100 hours minimum to about 120-140 hours maximum); minimum should also be set for night driving but optimal amount yet to be determined.</td>
<td>Age 16: 18% reduction in fatal crashes for 30+ hours compared to less or none Age 18+: 17-22% reduction in P driver crashes for ~80 hours compared to professional courses only</td>
</tr>
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<td>---------------------------------------------------------------------------------</td>
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<tr>
<td><strong>Supervisory driver requirements</strong></td>
<td>Full licence, age 25, zero BAC and potentially offence-free periods could control for risk; unknown whether less stringent requirements are adequate or more stringency is required; minimum age must at least be commensurate with peer passenger restriction</td>
<td>No evaluations evident</td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Formal education requirements</strong></td>
<td>Inexperience strongest contributor to young driver crash risk; evidence of cognitive skill deficits related to crash risk and that these can improve with targeted higher-order skills training; emerging evidence that resilience education and including parents in GDL education/training initiatives can reduce crashes</td>
<td>Limited evaluations within GDL models or in relation to crashes; knowledge/awareness/attitude (only) focused programs do not reduce crashes; programs that allow reduced L periods and provisional skid-training programs can increase crashes</td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Licence tests</strong></td>
<td>Establish a baseline of knowledge and skills required to progress through GDL with a focus on capabilities important for reducing crash risk</td>
<td>L to P knowledge and on-road tests inconsistent findings, hazard perception tests can reduce crashes; P1 to P2 hazard perception test can reduce at-fault crashes; Exit test can reduce crashes in following year</td>
<td>Unknown impact of introducing licence tests, but lower crash rates for those who pass licence tests on their first attempt. Hazard perception test: 3% reduction in crashes when tested at L to P transition, 10% reduction in at-fault crashes and 17% reduction in at-fault injury crashes when tested at P1 to P2 transition if pass first attempt. Exit test: 16% reduction in crashes in following year if pass first attempt (19% reduction for knowledge subtest, 5% reduction for hazard perception subtest)</td>
</tr>
<tr>
<td><strong>Minimum provisional age</strong></td>
<td>Crash evaluations plus neurobiological development research identify young age as risk factor, particularly independent driving at age 16 or younger</td>
<td>Crash, fatal crash / fatalities and insurance claim evaluations all show increased benefits at higher ages with age 17 better than 16 and age 18 better than 17</td>
<td>16½-17 vs 16: 23% reduction in fatal crashes of 16-year-olds 17 vs 16: 13% reduction in fatal crash rates of 15-17-year-olds, 9% reduction in insurance claims 18 vs 17: 20% reduction in crashes of 16-24-year-olds 18 vs 16: 12% reduction in crashes, 24% reduction in fatalities of P drivers</td>
</tr>
<tr>
<td><strong>Minimum provisional period</strong></td>
<td>Alcohol-related research demonstrates increased crash and fatality risk even at low alcohol levels until age 21 in particular, as well as 20-29; this suggests min. period set should extend from min. holding age to age 21, if not longer, in relation to a zero BAC</td>
<td>No evaluations evident</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
### Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

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<tr>
<td><strong>Night driving restriction</strong></td>
<td>Crash risk is greater at night for all drivers and exacerbated by inexperience and young age</td>
<td>Reductions in crashes and fatal crashes at night and during the day and in collision claims for restrictions varying in length of tenure and stat-end times; earlier start times yield greater benefits</td>
<td>Age 16: 16-59% reduction in night crashes, 9-22% reduction in day crashes Age 16-17: 49% reduction in night crashes, 5% reduction in day crashes; 35-36% reduction in severe or fatal injury in restricted hours and 17-28% overall; 10% reduction in all fatal crashes Age 17: 40% reduction in night crashes, 25% reduction in day crashes; for fatal crashes 44% night, 21% day By start times: 10pm or earlier: 19% reduction in crashes 9pm: 18% reduction in fatal crashes; 12% reduction in collision claims 12am: 12% reduction in fatal crashes; 8% reduction in collision claims</td>
</tr>
<tr>
<td><strong>Peer passenger restriction</strong></td>
<td>Crash evaluations plus neurobiological development research identify young age as risk factor, due to both heightened distraction and sensation seeking; risk increases incrementally with each additional peer-aged passenger</td>
<td>Reductions in crashes, fatal crashes, and fatal and injury crashes combined and in collision claims for restrictions varying in length of tenure and by number and age range of passengers restricted</td>
<td>One peer passenger only: 20% reduction in fatal crashes; 6% reduction in collision claims of 16-year-olds; 12% reduction in fatal crashes of 17-year-olds; 7% reduction in fatal crashes of 15-17-year-old drivers. No peer passengers: 20% reduction in fatal and injury crashes of 16-year-old drivers, 21% reduction in fatalities and injuries of their peer passengers; 25% reduction in involvement of peer passengers in crashes of 16-year-old drivers; 21% reduction in fatal crashes of drivers aged 15-17 years</td>
</tr>
<tr>
<td><strong>BAC limit</strong></td>
<td>Impact of even small amounts of alcohol on crash risk and fatal crash is even greater for young novices than older experienced drivers</td>
<td>Zero BAC limits reduce alcohol-related fatal crashes, fatal and injury crashes, and night-time single vehicle crashes significantly greater than other limits (including low levels such as 0.02%)</td>
<td>Zero BAC: 9-24% reduction in alcohol-related fatal crashes of 15-19-year-olds; 4-17% reduction in fatal and injury crashes of 15-19-year-olds; 22% reduction in night-time single vehicle fatalities (compared to 17% with a 0.02% BAC limit and 7% with a 0.04-0.05% limit)</td>
</tr>
<tr>
<td><strong>Mobile phone / other technology restriction</strong></td>
<td>Even hands-free phone use substantially increases crash risk for all drivers, exacerbated by inexperience and young age; when using phone, young drivers show considerable deficits in attention and driving performance</td>
<td>Limited research; inconsistent impact on phone use when driving; only one evaluation on crashes found no effect but in jurisdiction lacking police enforcement; no evaluations of other technology</td>
<td>Unknown</td>
</tr>
</tbody>
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Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

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<tr>
<td>Vehicle power restriction</td>
<td>Drivers aged &lt;25 of high performance vehicles have higher crash injury risk</td>
<td>Modelling assuming 100% compliance shows injury reductions but prevalence of ownership is low</td>
<td>Injury reductions ranging from 0-4-1.8% (Australia) to 2.2-2.5% (New Zealand)</td>
</tr>
<tr>
<td>Specific sanctions for speed, alcohol or other offences</td>
<td>Support to include specific sanctions for speeding and alcohol offences, including alcohol interlocks, and generally to include demerit point systems and good behaviour periods</td>
<td>Limited evaluation: inconsistent findings on effectiveness of maximum speed restrictions; one example of driver improvement program reducing crash risk</td>
<td>Unknown generally; one study demonstrated 10% reduced crash risk following completion of on-line driver improvement program</td>
</tr>
</tbody>
</table>

Note: L = Learner (permit/licence); P = Provisional (probationary/intermediate licence); P1 = first stage provisional licence (typically 12 months); P2 = second stage provisional licence (sometimes applicable in Australian GDLs)

Limitations and Other Considerations

There are other limitations to the present review and additional potential for misinterpretation to be addressed. GDL operates as a system and therefore isolating components for analysis can be misleading when comparing across similar but nevertheless different systems. Current evaluation approaches might not be sensitive to these differences.

Moreover, the effect of any one component will depend on what other components are already in place. Therefore, introducing a component into an otherwise weak GDL model could be expected to have a greater impact than when introduced into a stronger model. These sensitivities are masked in the result summaries. The examples of potential impact are also not directly comparable due to a lack of common age groups and outcomes for all components, with some including only crashes and others, importantly, fatalities and injuries. Therefore care must be taken when comparing the range of percentages reported.

Further, estimating the range of benefits that might be expected in Australasia based on North American evaluations could also differ due to variations in compliance. Compliance can vary greatly depending on enforcement practices and intensity and these are likely less strong in North American jurisdictions, where most states do not mandate display of P plates and parents, rather than police, are considered the chief enforcers of GDL. Caution should also be exercised generalising results from those North American jurisdictions that allow progression through the GDL at younger ages than in Australia.

A further limitation of the present research is that the majority of studies reviewed did not account for potential subgroup differences such as socioeconomic or other disadvantage. Such factors also contribute to young driver crash and injury risk and when considering introducing or strengthening a GDL component a balance is needed between ensuring the most promising GDL model for the majority of young drivers, but also ensuring that disadvantaged youth are not unduly further disadvantaged. This might need to be addressed by introducing additional support programs, or through exemptions or alternative requirements in certain circumstances that ensure that minimum standards are still met.

Concluding Comments

This work has been completed based on existing evaluations, with many arising from the United States. This is despite Australasia offering the contrasting GDL models needed for comparative evaluations. While several evaluations are in progress, it is clear that there are several gaps that still need to be addressed. Each jurisdiction should continue to monitor GDL research, but also evaluate their own data to the extent possible to ensure the appropriateness of the recommendations to their jurisdiction.
It is worth noting that a GDL model comprised of the strongest GDL components reported in the literature does not equate to a model that currently exists and has been tested as a unified model. Jurisdictions might choose to introduce or strengthen GDL components on a gradual basis rather than at once. Public discussion papers could also be released prior to significant changes in order to stimulate and canvass public debate to provide insights into community acceptance and potentially identify issues not yet considered.

Another GDL initiative undertaken in the United States that could also be considered for Australasia is that taken by the Insurance Institute for Highway Safety. An on-line benchmarking initiative that rated states as ‘good’, ‘fair’, ‘marginal’ or ‘poor’ contributed to most states achieving ‘good’ status over time. The Institute now instead provides an on-line GDL calculator where potential reductions in crashes due to introducing or strengthening certain GDL components can be immediately calculated by jurisdiction. This provides a useful and likely persuasive, motivating tool for policymakers, advocates and the general public alike. Striving for high quality evaluations of contrasting initiatives that Australasia has to offer could allow such a tool to be developed in our region and therefore support future campaigns to help strengthen our GDL systems to continue to protect young lives from road trauma.
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1. Introduction

1.1 Project Background

Austroads commissioned the authors to conduct a research project to identify effective components of graduated licensing schemes for car drivers in order to inform licensing policy for Australia and New Zealand. The focus was on the following specified components:

- minimum supervised driving requirements;
- mandatory formal training or education requirements;
- minimum provisional licensing age;
- night driving restrictions;
- passenger restrictions;
- blood/breath alcohol concentration restrictions;
- mobile phone or other technology restrictions (specifically including whether they should be extended, for example, to P2 drivers or all young drivers under 26 years of age);
- vehicle power restrictions; and
- specific sanctions for speed, alcohol or other offences.

Three main research questions were addressed for each component:

1. Is there research evidence that the GDL component addresses a contributing factor to young driver crashes and/or injuries?
2. Is there evaluation evidence that the GDL component is effective in reducing young driver crashes and/or injuries?
3. What is the potential (quantified) impact of the GDL component on young driver crashes and/or injuries?

To address these questions for the stated components, additional key components were also identified and discussed, given that most GDL components are not mutually exclusive but function together as a system.

The project scope was to review available literature, as well as any additional internal unpublished evaluations available from Austroads members, and did not include the collation and analysis of data from each Australasian jurisdiction.

The objective was to address each of the three main research questions for each component and to identify other relevant considerations for policymakers to explore in relation to their own jurisdictional conditions and capabilities, rather than to make specific recommendations applicable to all jurisdictions.

Please note that the term GDL is used rather than GLS (Graduated Licensing Systems), because this report is focused on drivers only and not motorcycle riders.
1.2 Young Driver Crash Risk

Young drivers are over-represented in road crashes and resulting casualties in Australia and New Zealand each year. For example, in 2009, the road fatality rate by population for 17-25 year-old drivers in Australia was almost double the national rate for all drivers (9.4 compared to 4.9 deaths per 100,000 population) (Department of Infrastructure 2010). In New Zealand, 15-24 years olds represented 23.0% of all driver fatalities that year and 31.9% of all driver casualties (deaths and injuries) (Ministry of Transport 2010). Australasia is not alone in these statistics, with similar findings reported around the world, such that road traffic crashes represent a leading cause of death for young people globally (Toroyan & Peden 2007).

While the term ‘young drivers’ indicates age is a contributing factor to these statistics, inexperience plays a more significant role, with novices of older ages also facing increased risk when first transitioning from a learner to independent licensed driver (McCatt, Mayhew, Braitman, Ferguson, Simpson 2009). Several critical skill deficits of novices have been identified, including hazard perception, attentional control, time sharing and calibration, which can take many years to develop (e.g. Lee 2007). This lack of experience and skill deficits therefore exacerbates the impact of risky behaviours that increase crash risk for all drivers, such as driving at night (Keall, Frith & Patterson 2004; Maycock 2002) or after consuming alcohol (Keall et al. 2004; Peck, Gebers, Voas & Romano 2008).

For the young, however, other neurobiological development factors also predispose them to greater crash risk when driving. While developmental changes to the brain occur throughout childhood, changes to the frontal cortex become prominent during the middle adolescent years (Johnson & Jones 2011), directly coinciding with typical legal minimum ages for driving. The frontal cortex is the part of the brain associated with such functions as regulating impulsivity, over-riding emotional arousal and anticipating consequences – all extremely important for ensuring safe driving and yet only reaching maturity in the early to mid 20s (Johnson & Jones 2011). Changes that delay melatonin release and increase sleep needs also result in a high risk of fatigue – another significant contributor to crash risk (Carskadon 2011; Pack, Pack, Rodgman, Cucchiara, Dinges, Schwab 1995). These factors contribute to young novices being more prone to distractions (e.g. from passengers or mobile phones) and more prone to experience fatigue in mornings and afternoons, not just at night.

Sensation seeking is a trait disposition towards varied, novel, complex and intense sensations and experiences, including willingness to take risks for such experiences (Zuckerman 1994). Sensation seeking is more evident among young people and associated with greater intentional risk taking when driving, particularly among young males (Waylen & McKenna 2002). This is particularly evident with speeding, which in some jurisdictions represents the single greatest contributor to youth fatalities (e.g. NSW, Audit Office of New South Wales 2011).

Together these factors support the need for targeted intervention for both young and novice drivers.

1.3 Graduated Driver Licensing

Graduated driver licensing (GDL), a staged approach to driver licensing from learner to provisional to full licence, was developed to address these major crash factors of age, inexperience and risk taking. Age and time based requirements and restrictions for novice drivers aim to reduce crash risk by allowing driving to commence only in lower risk conditions, graduating to higher risk conditions with increasing experience and maturity (Senserrick & Whelan 2003; Williams & Ferguson 2002). Additional or more stringent penalties target intentional risk taking, such as reduced demerit point thresholds, automatic suspensions for speeding infringements, and additional restrictions when returning to driving following a licence suspension (Senserrick 2009; Senserrick & Whelan 2003). These differentially include the following components (those of interest to Austroads), varying widely across Australian jurisdictions and New Zealand:

- Minimum supervised driving requirements: whereby novices must be accompanied by an experienced driver when learning to drive for a minimum time period (e.g. 6-12 months) and minimum number of driving hours (ranging from zero to 120 hours).
- Mandatory formal training or education requirements: classroom education and/or in-vehicle training requirements that variously apply at the pre-learner, learner or provisional licence stage.
• Minimum provisional licensing age: age at which novices can first drive independently, that is, without requiring an accompanying supervisory driver (ranging from 16 years 6 months to 18 years).

• Night driving restrictions: typically for drivers on their first provisional licence, restricting driving during the late night and/or early morning hours when crash risk is heightened for all drivers, but particularly young novice drivers (Keall, Frith & Patterson 2005; Williams 2003b).

• Passenger restrictions: typically restricting drivers on their first provisional licence from carrying multiple or peer-aged passengers, either at all times or at night only, due to the established increase in crash risk in these conditions for young novice drivers (Williams 2003b; Williams, Ferguson & McCartt 2007).

• Blood/breath alcohol concentration restrictions: reduced for learner and provisional drivers variously from zero up to 0.03% for young novices compared to 0.05% to 0.08% for older and fully-licensed drivers.

• Mobile phone or other technology restrictions: additional restrictions for learner and provisional drivers, including hands-free use of phones/technology that do not apply to fully-licensed drivers.

• Vehicle power restrictions: restrictions on vehicles that can be driven by early provisional drivers based on defined power capabilities such as power-to-weight ratio or designated sports/performance vehicle models.

• Specific sanctions for speed, alcohol or other offences: sanctions that are more stringent for young and/or novice drivers, such as reduced demerit point thresholds to licence suspension or loss of licence.

International reviews and multi-jurisdiction analyses have repeatedly demonstrated crash and fatality reductions among young novice drivers in jurisdictions that have stronger versus marginal or no GDL systems in place (e.g. Baker, Chen & Li 2006; McCartt, Teoh, Fields, Braitman & Hellinga 2010). For example, a 2010 analysis of US fatality data demonstrated that GDL laws rated as ‘good’ compared to ‘poor’ were associated with 30% lower fatal crash rates among 15-17-year-olds, and 11% lower if ‘fair’ (McCartt et al. 2010). A more recent analysis found even stronger effects with a 58% reduction in fatal crash risk for 16-year-olds with stricter learner stage conditions and a 44% reduction with stricter provisional stage conditions (Lyon, Pan & Li 2012).

Differentiating the relative contribution of specific components, such as those above, has been more challenging however, given that many such requirements or restrictions are introduced simultaneously and changes are made at the jurisdiction wide level making it difficult to determine an appropriate control or comparison group (Senserrick & Whelan 2003; Williams 2007). Moreover, GDL operates as a system and it is in some ways artificial to attempt to isolate the effectiveness of individual elements (discussed further in Chapter 5). Nonetheless, such indications are important for advancing the field and the science base for GDL research continues to grow as new evaluations and statistical methods allow greater differentiation of the relative contribution of particular components (Williams, Tefft & Grabowski 2012).

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2 In this IIHS classification, points are given for various components and values, such that: minimum learner permit ages attract 1 point for 16+ years (0 if less); learner tenure of 6+ months = 2 points, 3-5 months = 1 point (0 if less); supervised driving 30+ hours = 1 point (0 if less); provisional night restriction from 10 pm or earlier = 2 points, after 10pm = 1 point (0 if none); provisional peer passenger restriction maximum 0-1 passenger = 2 points, 2 passengers = 1 point (0 if 3+); and a point each for 12 months of night restrictions and 12 months of passenger restrictions (0 if <12 months). Therefore learner stage total points can vary from 0-4 and provisional from 0-6. Total points scores are used to rate GDL models as ‘good’ = 6+ points, ‘fair’ = 4-5 points, ‘marginal’ = 2-3 points and ‘poor’ = 0-1 point.

3 In the Lyon et al. study, the IIHS point systems was used to classify learner stages as ‘strong’ = 4 points, ‘moderate’ = 1-3 points, ‘poor’ = 0 points and provisional stages as ‘strong’ = 5-6 points, ‘moderate’ = 1-4 points, ‘poor’ = 0 points.
1.4 Report Structure

This report continues by briefly describing the literature review methods, followed by a contextual overview of the history of GDL introduction in New Zealand and Australian jurisdictions, and a summary of their current licensing systems, as provided by Austroads members. Given that the majority of evaluations available in this field yield from North America, the licensing systems in North American jurisdictions are then summarised for comparison. This is followed by the review of the evaluation literature for each GDL component of interest. A tabulated summary on research relating to the three main research questions for each component is then provided, together with other considerations for policymakers when introducing or revising GDL components. The report ends with some concluding comments on future directions for GDL in Australasia.
2. Literature Review Methods

The authors have extensively reviewed and monitored the GDL literature over the past decade (chronological examples include: Senserrick & Whelan 2002, 2003; Williams 2003a; Senserrick & Haworth 2004, 2005; Senserrick 2007; Williams 2007; Williams & Mayhew 2008; Senserrick 2009; Senserrick, Ivers, Boufous & Stevenson 2009b; Williams & Shults 2010; Williams et al. 2012). We therefore drew on these and the most recent reviews and evaluations available. The focus was on effectiveness research with quantifiable outcomes. The scope was research arising from jurisdictions in Australasia, North America and high income countries in Europe. Please note that this report covers the early 2013 review period to the time of initial drafting. Thus, there exist other reports on GDL published during the report processing period that were not considered as part of the current literature review (e.g., Kinnear, Lloyd, Helman, Husband, Scoons, Jones, Stradling, McKenna & Broughton 2013; Steadman, Bush, Thygerson & Barnes, 2014). Electronic searches were also conducted to identify more recent GDL literature. PubMed was primarily used to identify peer-reviewed journal articles or book content. PubMed is a database of the US National Library of Medicine, National Institutes of Health, which comprises more than 21 million citations for biomedical literature from MEDLINE, life science journals, and online books.

Given the terms ‘driver’ and ‘licence’ have multiple applications, compound search terms were utilised in conjunction with each country (‘Australia’, ‘New Zealand’) and each additional Australian jurisdiction without ‘Australia’ in the title (‘New South Wales’, ‘Northern Territory’, ‘Queensland’, ‘Tasmania’ and ‘Victoria’):

- ‘driver’ AND ['licensing' OR 'licence' OR 'license']
- ‘driver’ AND ['young' OR 'novice']
- ‘driver’ AND ‘restriction’.

Additional ‘grey literature’, that is, reports and publications not necessarily peer-reviewed and typically written for government/authorities was also targeted, given much of the work in Australia in particular had been commissioned by state and territory road administrations. Reference lists and websites of road administrations and relevant road safety research organisations in each jurisdiction were individually searched. Internal unpublished reports by Australasian jurisdiction road administrations were also requested through Austroads members.

A summary of the evidence available in relation to each of the three main research questions for each GDL component was tabulated as:

- evidence that the GDL component addresses a contributing factor to young driver crashes and/or injuries;
- evidence that introducing the GDL component reduces young driver crashes and/or injuries; and
- quantified examples of the potential impact of introducing the GDL component on young driver crashes and/or injuries.

It is noted here that this review focused on a system for the ‘average’ majority of Australasian young novices entering into the driver licensing system for the first time. It does not extend to those with certain medical conditions or other special needs, those commencing at older ages (such as over age 25), nor for returning drivers (such as following licence disqualifications or other absences) or drivers emigrating from other countries, for example. Such variations are less extensively evaluated in national and international literature and would require in-depth jurisdictional analysis. Crash outcomes were the main focus and injuries resulting from crashes when available.
3. Current GDL Models in Australia and New Zealand

Components of the licensing systems now in force in New Zealand and in the eight Australian states and territories are displayed in Table 1. Mainstream requirements and options are summarised, notwithstanding recognition that exemptions can apply in certain circumstances (which are beyond the scope of this review and not documented). These licensing systems have undergone many changes over the years, and it is of interest to trace their evolution and progress toward incorporating best practice provisions of GDL.

In New Zealand the licensing system is federally mandated. Prior to 1987, 15-year-olds in New Zealand could obtain a full privilege driver licence by passing standard driving tests. In 1984, the Ministry of Transport invited Dr Patricia Waller to New Zealand to advise on how the young driver crash problem could be addressed (Begg & Stephenson 2003). Waller is credited as being the originator of graduated licensing, outlining in the early 1970s a staged approach including an extended supervised learner phase, and night and passenger restrictions for a period of time until full privileges were granted. The genesis of this integrated system of GDL is described in Waller (2003). This integrated scheme did not catch on in North America in the 1970s and 1980s, and New Zealand, in 1987, became the first jurisdiction to adopt the full model proposed by Waller. The NZ system was upgraded in 1999, and was amended in 2011 by increasing the learner starting age from 15 to 16. This move had long been supported by New Zealand safety researchers (Begg & Langley 2009).

In Australia, NSW and VIC were among the earliest jurisdictions to lay the foundation for an integrated GDL approach by requiring a learner permit and introducing a provisional stage as early as the 1960s. In NSW, for example, the provisional licence was issued for 12 months with a maximum speed restriction of 40 miles per hour (Commissioner for Motor Transport 1965). This did not however represent an integrated GDL model such as that later proposed by Waller. For example, there was no true focus on an extended learner phase with specific initiatives aimed at increasing safety as a provisional driver. Rather, the learner permit phase was used to gain basic vehicle handling skills, which when demonstrated would result in a provisional licence. Most of the early driving experience therefore was typically gained on the provisional licence.

Licensing of novice drivers in Australia is the responsibility of individual states and territories. No national government body can enact licensing legislation but the then Federal Office of Road Safety (now Australian Transport Safety Bureau) supported the introduction of graduated licensing, as proposed by Waller, as early as the 1980s, encouraging states to adopt this approach. In response, licensing system changes were made, although in 1994 it was concluded that existing novice driver licensing systems in Australia failed to conform to the concept of graduated licensing in a truly integrated form (Haworth 1994). The basis for this conclusion was that the licensing components in force tended to reduce exposure rather than to increase exposure in safer driving environments. The principal objective of graduated licensing is to provide on-road driving experience under conditions that minimise exposure to risk.
<table>
<thead>
<tr>
<th>LEARNER PERMIT STAGE</th>
<th>NSW</th>
<th>VIC</th>
<th>QLD</th>
<th>ACT</th>
<th>SA</th>
<th>TAS</th>
<th>NT</th>
<th>WA</th>
<th>NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Age</td>
<td>16y</td>
<td>16y</td>
<td>16y</td>
<td>15y9m</td>
<td>16y</td>
<td>16y</td>
<td>16y</td>
<td>16y</td>
<td>16y</td>
</tr>
<tr>
<td>Minimum Tenure</td>
<td>12m if &lt;25y age;</td>
<td>12m if &lt;21y age;</td>
<td>6m if 21y to &lt;25y age;</td>
<td>3m if ≥25y age</td>
<td>6m</td>
<td>12 months if &lt;25y age</td>
<td>6 months if 25y or older</td>
<td>12m (continuous);</td>
<td>6m</td>
</tr>
<tr>
<td></td>
<td>if &lt;25y age;</td>
<td>6m if 21y to &lt;25y age;</td>
<td>3m if ≥25y age</td>
<td></td>
<td></td>
<td>(3m L1, 9m L2)</td>
<td></td>
<td>6m</td>
<td></td>
</tr>
<tr>
<td>Permit Validity</td>
<td>5y</td>
<td>10y</td>
<td>3y</td>
<td>2y</td>
<td>2y</td>
<td>3y</td>
<td>2y</td>
<td>10y</td>
<td>N/A</td>
</tr>
<tr>
<td>Test to obtain Learner licence</td>
<td>Computer-based test</td>
<td>Computer-based test</td>
<td>Written test</td>
<td>Computer –based test in mandatory Road Ready Learner Licence Course</td>
<td>Computer-based test or written test</td>
<td>Computer-based test L1; On-road driving assessment L2</td>
<td>Written test</td>
<td>Computer-based test</td>
<td>Computer-based theory test of 35 questions; multi-choice</td>
</tr>
<tr>
<td>Logbook supervised entries/Training course</td>
<td>120hrs, incl. 20hrs night &lt;25y age; N/A if ≥25y age; 1hr professional instruction can be recorded as 3hrs (max 10=30hrs); Option to complete Safer Drivers Course for 20hrs credit</td>
<td>120hrs, incl. 10hrs night &lt;21y age; N/A &gt;21y age</td>
<td>100hrs, incl. 10hrs night &lt;25y age; N/A if ≥25y age; 1hr professional instruction can be recorded as 3hrs (max 10=30hrs)</td>
<td>Road Ready Learner Licence Course: option to complete practical driving test for P licence or Competency-Based Training and Assessment with logbook (50h recommended)</td>
<td>75hrs, incl. 15hrs night driving</td>
<td>None L1; 50hrs L2</td>
<td>N/A</td>
<td>25 hours pre-PDA</td>
<td>25hrs post-PDA</td>
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<tr>
<td>BAC Limit</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>0.03 if &lt;20y age; 0.08 if ≥20y age</td>
</tr>
<tr>
<td>Speed Limit Restriction</td>
<td>90 km/h</td>
<td>As sign posted</td>
<td>As sign posted</td>
<td>As sign posted</td>
<td>100 km/h</td>
<td>80 km/h</td>
<td>80 km/h unless under professional instruction in approved training program</td>
<td>100 km/h</td>
<td>As sign posted</td>
</tr>
<tr>
<td>Demerit Point Threshold</td>
<td>4 points in 3yrs</td>
<td>5 points in 12m; 12 points in 3y</td>
<td>4 points in 12m</td>
<td>12 points in 3y</td>
<td>4 points in 3y</td>
<td>4 points in 12m; 12 points in 3y</td>
<td>5 points in 12m; 12 points in 3y</td>
<td>4 points in first year; 8 points in second year, 12 points third year onwards</td>
<td>100 points in 2y</td>
</tr>
<tr>
<td>Mobile phones</td>
<td>No mobile phone use incl. hands free or loudspeaker devices</td>
<td>No mobile phone use, texting or hands free</td>
<td>Hands free kits, wireless headsets and loudspeaker use not permitted: Passenger/supervisor not permitted loudspeaker use but can use hand held or hands free for one-way conversation if do not distract driver</td>
<td>Hand held use of mobile phone banned, hands free kits permitted</td>
<td>No use of any mobile phone function while driving</td>
<td>No use of mobile phone</td>
<td>No mobile phone use incl. hands free</td>
<td>Hand held use of mobile phone banned, hands free kits permitted</td>
<td>Hand held use of mobile phone banned, hands free kits permitted</td>
</tr>
<tr>
<td>Towing</td>
<td>No towing</td>
<td>No towing</td>
<td>Permitted to tow another vehicle but cannot steer/drive vehicle being towed</td>
<td>Small trailers only not exceeding 750kg GVM</td>
<td>Allowed to tow trailers</td>
<td>No towing</td>
<td>Permitted to tow trailer/vehicle up to max. towing capacity of vehicle: May control vehicle under tow provided complying with all other licence conditions</td>
<td>Permitted to tow vehicle providing complying with all L licence conditions and relevant traffic code regulations</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>NSW</td>
<td>VIC</td>
<td>QLD</td>
<td>ACT</td>
<td>SA</td>
<td>TAS</td>
<td>NT</td>
<td>WA</td>
<td>NZ</td>
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</tr>
<tr>
<td><strong>PROVISIONAL LICENCE STAGE 1</strong></td>
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<td></td>
</tr>
<tr>
<td>Minimum Age</td>
<td>17y</td>
<td>18y</td>
<td>17y</td>
<td>17y</td>
<td>17y</td>
<td>17y</td>
<td>16y 6m</td>
<td>17y</td>
<td>16y 6m</td>
</tr>
<tr>
<td>Minimum Tenure</td>
<td>12m</td>
<td>12m</td>
<td>12m</td>
<td>3y</td>
<td>12m (continuous)</td>
<td>2y if &lt;25y age; 1y if ≥25y age</td>
<td>6m</td>
<td>18m if &lt;25y age plus minimum age 18y; 12m if &lt;25y age if complete approved driving skills course plus min age 17½y; 6m if ≥25y age; 3m if ≥25y age if complete approved driving skills course</td>
<td></td>
</tr>
<tr>
<td>Test to obtain P1 licence</td>
<td>Practical driving test</td>
<td>Practical driving test &amp; Hazard Perception test</td>
<td>Practical driving test</td>
<td>Practical driving test or Competency-Based Training and Assessment with accredited driving instructor</td>
<td>Practical driving test or Competency-Based Training and Assessment with authorised/ accredited driving instructor</td>
<td>On road driving assessment</td>
<td>Practical driving test</td>
<td>Hazard Perception Test</td>
<td>Practical driving test</td>
</tr>
<tr>
<td>BAC Limit</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>0.03 if &lt;20y age; 0.08 if ≥20y age</td>
</tr>
<tr>
<td>Speed Limit Restriction</td>
<td>90 km/h</td>
<td>As sign posted</td>
<td>As sign posted</td>
<td>100 km/h</td>
<td>80 km/h</td>
<td>100 km/h</td>
<td>As sign posted</td>
<td>As sign posted</td>
<td>As sign posted</td>
</tr>
<tr>
<td>Demerit Point Threshold</td>
<td>4 points in 3y</td>
<td>5 points in 1y; 12 points in 3y</td>
<td>4 points in 1y; 8 points if 3y if complete Road Ready Plus course</td>
<td>4 points in 3y</td>
<td>4 points in 1y; 12 points in 3y</td>
<td>5 points in 1y</td>
<td>4 points in first year; 8 points in second year, 12 points third year onwards</td>
<td>100 points in 2y²</td>
<td></td>
</tr>
<tr>
<td>Night time driving restriction (when unsupervised)</td>
<td>N/A</td>
<td>N/A</td>
<td>11pm to 5am for at least 1y if aged &lt;25 and commit high speed offence or accumulate excessive demerit points resulting in suspension or good driving behavior period or offence resulting in court disqualification</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Midnight to 5am unless driving to/from work, in course of employment, studying or doing acceptable voluntary work</td>
<td>10pm to 5am</td>
<td></td>
</tr>
<tr>
<td>Passenger Restriction (when unsupervised)</td>
<td>One passenger &lt;2½y age between 11pm and 5am if &lt;25y age; One passenger only for 12m if returning from licence cancellation</td>
<td>One passenger 16-2½y age only; One passenger only for remainder of P1 period if returning from licence cancellation</td>
<td>One passenger &lt;2½y age (excluding immediate family members) between 11pm to 5am if &lt;25y age</td>
<td>N/A</td>
<td>No passengers between midnight and 5am when returning from a serious licence disqualified offence²</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>No passengers (excluding dependents)</td>
</tr>
<tr>
<td>Vehicle Restriction</td>
<td>Must not drive high performance vehicles; Automatic condition if test passed in Auto transmission vehicle</td>
<td>Can only drive approved probationary vehicles (based on performance and power-to-weight criteria);³ Automatic condition if test passed in Auto transmission vehicle</td>
<td>Must not drive high performance vehicles if &lt;25y age; Automatic condition if test passed in Auto transmission vehicle</td>
<td>Automatic condition for 1y if test passed in Auto transmission vehicle</td>
<td>Must not drive high powered vehicle if &lt;25y age</td>
<td>Automatic condition if test passed in Auto transmission vehicle</td>
<td>Automatic condition for 1y if test passed in Auto transmission vehicle</td>
<td>Automatic condition if test passed in Auto transmission vehicle unless supervised</td>
<td></td>
</tr>
<tr>
<td>Mobile phones</td>
<td>NSW</td>
<td>VIC</td>
<td>QLD</td>
<td>ACT</td>
<td>SA</td>
<td>TAS</td>
<td>NT</td>
<td>WA</td>
<td>NZ</td>
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</tr>
<tr>
<td></td>
<td>No mobile phone use including hands free or loudspeaker devices</td>
<td>No mobile phone use, texting or hands free.</td>
<td>Hands free kits, wireless headsets and loudspeaker use not permitted if &lt;25y age or returning from disqualification for offence when &lt;25y age; Passenger/supervisor not permitted loudspeaker use but can use hand held or hands free for one-way conversation if do not distract driver</td>
<td>Hand held use of mobile phone banned, hands free kits permitted</td>
<td>No use of any mobile phone function while driving</td>
<td>Hand held use of mobile phone banned, hands free kits permitted</td>
<td>No use of mobile phone incl. hands free</td>
<td>Hand held use of mobile phone banned, hands free kits permitted</td>
<td>Hand held use of mobile phone banned, hands free kits permitted</td>
</tr>
<tr>
<td>Towing</td>
<td>Light trailers only up to 250kg unloaded weight</td>
<td>Only for work or under instruction</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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</tr>
</tbody>
</table>

**PROVISIONAL LICENCE STAGE 2**

<table>
<thead>
<tr>
<th>Minimum Age</th>
<th>18y</th>
<th>19 y</th>
<th>18y</th>
<th>N/A</th>
<th>18y</th>
<th>18 y</th>
<th>N/A</th>
<th>17½y</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence Tenure to progress to next stage</td>
<td>2y</td>
<td>3 y; Good driving record</td>
<td>2y if &lt;25y age; 1y if ≥25y age or ≥24y and P1 issued when ≥23y; Exempt if P1 issued when ≥24y age (go straight to unrestricted)</td>
<td>N/A</td>
<td>6; 1y if P1 held for only 1y</td>
<td>2y if &lt;23y age; 1y if ≥23y to &lt;25y age or until 25y age, whichever first; 1y if ≥24y age</td>
<td>N/A</td>
<td>18 m P1+P2 or until age 19, whichever is the later</td>
<td>N/A</td>
</tr>
<tr>
<td>Test to obtain P2 licence</td>
<td>Hazard Perception Test</td>
<td>N/A</td>
<td>Hazard Perception Test</td>
<td>N/A</td>
<td>Hazard Perception Test</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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</tr>
<tr>
<td>BAC Limit</td>
<td>Zero</td>
<td>Zero</td>
<td>Zero</td>
<td>N/A</td>
<td>Zero</td>
<td>N/A</td>
<td>Zero</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Speed Limit Restriction</td>
<td>100 km/h</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>100 km/h</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Dement Point Threshold</td>
<td>7 points in 3y</td>
<td>5 points in 1y; 12 points in 3y</td>
<td>4 points in 1y</td>
<td>N/A</td>
<td>4 points in 3y</td>
<td>4 points in 1y; 12 points in 3y</td>
<td>N/A</td>
<td>4 points in 1y 8 points in 2y</td>
<td>N/A</td>
</tr>
<tr>
<td>Night time driving restriction (when unsupervised)</td>
<td>N/A</td>
<td>N/A</td>
<td>11pm to 5am for at least 1y if aged ≥25 and commit high speed offence or accumulate excessive demerit points resulting in suspension or good driving behavior period or offence resulting in court disqualification</td>
<td>N/A</td>
<td>Midnight to 5am for 1y for drivers returning from a serious licence disqualification offence</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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</tr>
<tr>
<td>Passenger Restriction (when unsupervised)</td>
<td>One passenger only for 12m if returning from licence cancellation</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>No passengers midnight to 5am when returning from serious licence disqualification offence</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Vehicle Restriction</td>
<td>Must not drive high performance vehicles</td>
<td>Can only drive approved probationary vehicles (based on performance and power-to-weight criteria)</td>
<td>Must not drive high performance vehicles if &lt;25y age</td>
<td>N/A</td>
<td>Must not drive high performance vehicles if &lt;25y age</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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</tr>
<tr>
<td>Mobile phones</td>
<td>No hand-held mobile phone use</td>
<td>No hand-held mobile phone use</td>
<td>Hand-held use only permitted while vehicle is legally and safely parked</td>
<td>N/A</td>
<td>No hand-held mobile phone use</td>
<td>Hand held use of mobile phone banned, hands free kits permitted</td>
<td>N/A</td>
<td>Use of mobile phone banned, hands free kits permitted</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

<table>
<thead>
<tr>
<th>NSW</th>
<th>VIC</th>
<th>QLD</th>
<th>ACT</th>
<th>SA</th>
<th>TAS</th>
<th>NT</th>
<th>WA</th>
<th>NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towing</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td></td>
</tr>
<tr>
<td><strong>UNRESTRICTED LICENCE STAGE</strong></td>
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<tr>
<td>Minimum Age</td>
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<td>22y</td>
<td>20y</td>
<td>20y</td>
<td>19y (20y if 1+ demerit points)</td>
<td>20y</td>
<td>18y6m</td>
<td>19y</td>
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<td>3 or 10y</td>
<td>1 to 5y</td>
<td>1 to 5y</td>
<td>1 to 10y</td>
<td>1 to 5y</td>
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<td>1 or 5y</td>
</tr>
<tr>
<td>Test to obtain licence</td>
<td>Driver Qualification Test (hazard perception test and driving knowledge test)</td>
<td>N/A</td>
<td>N/A</td>
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<td>&lt;0.05</td>
<td>0.05</td>
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<td>Zero first 3y post-learner licence if &lt;25y age; 0.05 if ≥25y age</td>
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<tr>
<td>Demerit Points</td>
<td>13 points in 3y</td>
<td>12 points in 3y</td>
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<td>12 points in 3y</td>
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Notes:
- a. Except for temporary overseas visitors who are restricted to a 12m validity period.
- b. Also option under a Pilot Program to apply for a restricted P1 licence for young people in 3 remote NSW communities after completing at least 50 supervised driving hours, restricted for the purposes only of driving to work, education and medical appointments for 6 months.
- c. L and P1 licence holders will have licence suspended for at least 3 months for any speeding offence. Immediate suspension and confiscation of licence for speeding >30 km/h over speed limit also applies for all drivers.
- d. Applies to all NZ drivers (not a reduced threshold) and relates to a different demerit point system to Australia where the maximum for fully licensed drivers is 12 points.
- e. WA’s GDL does not specify ‘P1’ and ‘P2’ stages per se. However, the provisional licence is subject to night-time driving restricted for the first 6m and the red background coloured P plate displayed. Therefore for the purposes of this summary table, these are divided into the stage 1 and stage 2 sections of the table.
- f. Any licence suspension or cancellation will extend the period of the licence by at least 6 months, plus the period of suspension.
- g. WA’s GDL does not specify a stage 1 and stage 2 sections per se. However, the provisional licence is subject to night-time driving restricted for the first 6m and the red background coloured P plate displayed. Therefore for the purposes of this summary table, these are divided into the stage 1 and stage 2 sections of the table.
- h. Optional course can only be taken after 6m on provisional licence; licence must be endorsed; endorsement also allows not to display P plates.
- i. From 28 July 2014, South Australia will introduce a restriction on driving between midnight and 5am for P1 drivers under the age of 25 for the duration of their P1 licence. As such, it will no longer be a sanction following a serious disqualification offence.
- j. From 28 July 2014, South Australia will be reintroducing the passenger restriction for P1 drivers under the age of 25, allowing no more than one passenger aged 16 to 20 years for the duration of their P1 licence, excluding immediate family members. As such, it will no longer be a sanction following a serious disqualification offence.
- l. South Australia will be reintroducing the passenger restriction for P1 drivers under the age of 25, allowing no more than one passenger aged 16 to 20 years for the duration of their P1 licence, excluding immediate family members. As such, it will no longer be a sanction following a serious disqualification offence. From 28 July 2014, South Australia will extending the minimum provisional licence period from two to three years by requiring one year on a P1 licence and two years on a P2 licence, effectively increasing the fully/unrestricted licence minimum age to 20 years.
- m. From 28 July 2014, South Australia will be moving the Hazard Perception Test to be a requirement of graduation from L to P1, rather than P1 to P2.
Since the mid-1990s further changes in licensing systems have been made in Australia, and many of the changes are recent. For example, New South Wales introduced a new licensing system in 1966, adopted a revised system in 2000, and made significant further additions and revisions in 2005-2008 (Faulks & Irwin 2009). Recent trends include the introduction of required supervised driving hours of 100 or more, and versions of night and passenger restrictions, although no Australian jurisdiction has introduced both night and passenger restrictions as originally proposed by Waller and implemented in New Zealand (and extensively throughout the United States).

Night and passenger restrictions have long been discussed in Australia. In the early 1980s, the Victorian government was keen to introduce graduated licensing including night and passenger restrictions, on the basis of research indicating the high crash risk associated with these activities. However, the trade-off was the possibility of the licensing age dropping from 18 to 17 or 17½, and the policy was rejected. In 1987 the Federal Office of Road Safety designed a comprehensive four-stage licensing system including night and passenger restrictions and urged its adoption (Boughton, Carrick & Noonan 1987). No Australian jurisdiction did so at that time. Reasons for not doing so have centred largely around the argument that such restrictions are not so appropriate in Australia, where novices are older than in North America and New Zealand, and concerns about adverse effects on young people’s social mobility (Haworth 1994; Victoria Minister of Transport 2005). Reasons for the turnaround in policy are not fully understood, but likely factors include recognition of the high crash risk of these activities for novices, the demonstrated crash reduction effects in North America and New Zealand, and realisation that in Australia and around the world, the first few months of driving after the road test has been passed are extremely high risk (Mayhew, Simpson, & Pak 2003; Queensland Government 2005; Sagberg 1998; Victoria Minister of Transport 2005). This is the period during which night and passenger restrictions come into play.

All of the current Australian licensing systems are multi-stage, with a learner period, and one or more provisional phases. Within these stages, there is substantial variation across jurisdictions. Variation in and of itself is not necessarily a problem. It has long been recognised that each jurisdiction will implement a system reflecting its own geographic, economic, social, and political conditions (Traffic Injury Research Foundation 1991). It is an attractive aspect of graduated licensing that it can vary substantially in operational features, while still including basic prevention principles. At the same time, it is important that the basics include policies that reflect best practice in managing the high crash risk that accompanies beginning driving.

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4 For clarity, we use the term ‘provisional’ (as utilised in the Project Brief) to refer to any licence or stage between the learner stage/s and the full licence stage; also known as ‘probationary’ in some Australasian jurisdictions or as ‘intermediate’ in North America. Where no such licence stage exists, this is referred to as the first period of ‘unsupervised’ or ‘independent’ driving. Likewise we note our use of ‘full licence’ or ‘full privilege licence’ to refer to the final stage also identified in the literature as an ‘open’ or ‘unrestricted’ licence.
4. Overview of GDL Evaluation Literature

GDL systems have existed for many years in New Zealand and North America and there is a substantial body of research on its effects from these jurisdictions, including much of the research on GDL components arising from North America. Australian research is more limited despite multiple jurisdictions, contrasting GDL models and several revisions. Further, in Australia certain features of GDL models under review in the current project (particularly high levels of supervised hours requirements and night and passenger restrictions) were only more recently introduced. Comparison research between Australian jurisdictions (as often applied in US research) is also limited by the lack of publicly available on-line national databases, whereas in the US there are national collections of all fatal crashes (Fatality Analysis Reporting System) and representative samples of police-reported crashes (National Automotive Sampling System General Estimates Systems) that are readily accessible on-line.

Other somewhat comparable jurisdictions in high income countries in Europe have subsequently included some GDL features, such as learner requirements, into their licensing systems, but not generally complete examples of the integrated GDL systems presently under review; although increasingly news releases have announced imminent changes (e.g., BBC News Northern Ireland 2012) and the UK Parliament has called on the Government to introduce systems as in place in the US, Canada and Australia (House of Commons 2013). Some examples of component evaluations also arise from these jurisdictions.

The disparity of GDL models in Australia and New Zealand and fragmentation of evaluations from their jurisdictions require this wider international body of research to be reviewed collectively to be instructive in guiding a model Australasian licensing system.

It is important to reiterate that evaluating the relative effectiveness of specific GDL components is challenging given several components are typically introduced simultaneously and operate at the jurisdiction wide level making it difficult to determine an appropriate control or comparison group (Senserrick & Whelan 2003; Williams 2007). Moreover, as various components act synergistically, isolated evaluation can be artificial. For example, extending the minimum learner period necessarily increases the minimum provisional age and can subsequently increase the full licence age if the minimum provisional period still applies. Crash reductions from such a change could be credited legitimately to the introduced measure of extending the learner period, but could not be assumed to be due to greater exposure or experience as a learner per se, without considering additional effects due to older age when first driving unaccompanied and first driving unrestricted. Such nuances must be acknowledged.

4.1 GDL Models in North America

Given the wealth of information arising from North American GDL models, these are first detailed here for comparison to Table 1. The central features of North American GDLs are requirements for a lengthened learner stage allowing for the accumulation of extensive supervised driving experience, and a provisional phase allowing unsupervised driving except in the highest risk conditions: late at night or with young passengers. A full privilege licence is available following these two stages. This type of program differs from early Australian licensing systems, with long provisional periods, but not night or passenger restrictions, which have only recently begun to be introduced.

Graduated licensing was discussed in North America beginning in the early 1970s, but did not catch on, even though several states had night driving restrictions dating back many years. New Zealand was the first to enact a GDL system with an extended learner phase, and night and passenger restrictions, in 1987. Beginning in the mid-1990s, US states and Canadian provinces started adopting GDL policies. Since that time, all 50 states and the District of Columbia, and all 13 provinces and territories, have introduced versions of GDL. The main features of these systems are summarised in tables in Appendix I.
As can be seen in comparison to Table 1, Australia’s typical licensing ages (16 for learner permit, 17 for provisional licence, older than 18 for full licence) are generally higher than in North America and New Zealand. In the original New Zealand legislation, since modified but upon which most of the research has been based, the learner age was 15, and there was a required 6-month holding period, which could be reduced to 3 months with driver education. The provisional period with a night restriction (10 pm-5 am) and a passenger restriction (no passengers less than age 20) applied for 18 months, but could be reduced to 9 months if a Defensive Driving Course or Advanced Driving Course was completed. Thus a full licence could be obtained shortly after age 16. In the United States, the learner permit age is in most cases 15-16, a provisional licence is available at ages 16-16½, and a full licence at 16½-18. New Jersey is the one US state that is most similar to Australia, with a permit age of 16, provisional licence age of 17, and full licensing minimum age of 18. In Canada, the learner permit age is generally 16, the provisional licence age 16-16½, and full licensing age 17½-18½. However, as in the case of New Zealand, in the majority of provinces there are ‘time discounts’ for driver education, allowing novices to start the learner period at a younger age or pass through it more quickly. The effectiveness estimates for GDL components based on research in New Zealand and North America therefore need to be considered in light of the fact that they are generally applicable to younger drivers than would be the case in Australia. Likewise, effectiveness estimates for GDL components based on research in Australia need to be considered in light of the fact that they are generally applicable to older drivers than would be the case in New Zealand.

4.2 GDL Evaluations

There are many evaluations of GDL programs in the literature based on single jurisdictions or multiple jurisdictions, including national studies. It is well established that GDL systems are effective in reducing provisional driver crashes. New Zealand’s GDL is reported to have had a 25% initial decrease in casualty crashes among 15-19 year-olds when first implemented, followed by a continuing 8% reduction in police-reported crashes (Frith & Perkins 1992) and 7% reduction in crash-related injuries (Langley, Wagenaar & Begg 1996). A review of 27 studies conducted in the United States and Canada since 2002 found crash reductions in the 20-40% range, unusually high for a highway safety countermeasure (Shope 2007). Similarly, since its most recent changes to its GDL model from 1 July 2007 (Table 1), NSW has experienced a 40% reduction in provisional driver fatal crashes (Audit Office of New South Wales 2011).

North American evaluation studies conducted both prior to 2002 and subsequent to 2007 are in line with these findings (Shope & Molnar 2003; Williams & Shults 2010). The results pertain primarily to 16-year-old drivers, the age group that in typical North American jurisdictions is most directly affected by GDL policies. Seventeen-year-olds also are subject to GDL policies in many jurisdictions, at least for part of the year, and when that is the case there is evidence for positive effects in this age group (Shope 2007). Effects at age 18 and 19, when many in the United States, and some in Canada, have graduated to full licence status, have not been definitively established (Lyon et al. 2012; Masten, Foss & Marshall 2011; McCartt et al. 2010). Some studies have reported positive effects; others have indicated negative effects (Williams et al. 2012).

Graduated licensing clearly is effective policy, but although its general structure is set, there are many options to choose from. As a result, tremendous variation exists. For example, in the United States, learner starting ages range from 14 to 16, extended learner holding periods from 3 to 12 months, and minimum required practice hours generally from 20 to 65. One state, Oregon, requires 100 hours but only for those who have not taken a driver education course. Night driving restrictions exist in all but one jurisdiction, with starting times generally from 9 pm to 1 am. Forty-six jurisdictions have passenger restrictions, and the number of passengers allowed ranges from none to three. No two of the 73 North American, New Zealand and Australian systems are exactly the same. It is actually an advantage having this variation in terms of research opportunities, and also having available GDLs that were adopted at various points in time. In single-jurisdiction studies it is possible to estimate the effects of features such as night driving restrictions, because before-after comparisons can be made of crashes that occur in restricted versus non-restricted hours. However, most of the relevant studies of GDL components are necessarily based on multiple-jurisdiction studies.
4.3 Searching for Guidance

Once the graduated licensing movement began in the United States and Canada, a bandwagon effect developed as states and provinces rushed to adopt this policy. There was little guidance as to how to structure a graduated system, and many states were proceeding without full knowledge of what such a licensing system was meant to accomplish. To provide guidelines, the Traffic Injury Research Foundation (TIRF) in Canada, and the Insurance Institute for Highway Safety (IIHS) in the United States, prime movers of GDL in the two countries, developed Graduated Licensing: a Blueprint for North America (Williams & Mayhew 2004), with recommended practices. The recommendations were evidence-based where possible, e.g. research existed on the effects of night driving restrictions that were already in place. However, in many cases relevant research was lacking and jurisdictions were merely urged to adopt policies consonant with the principles of graduated licensing but lacking empirical verification, e.g. establish a learner phase of at least six months.

Several versions of the Blueprint were issued as more information became available (Williams & Mayhew 2004). Eventually, the Blueprint was superseded by GDL rating systems developed separately by IIHS and TIRF. The IIHS system called for a learner starting age of 16, learner holding period of at least six months, 30-50 hours of supervised driving practice, a night driving restriction in the provisional stage starting at 9 or 10 pm, a passenger restriction allowing no more than one non-family member, and night and passenger restrictions lasting until age 18 (Insurance Institute for Highway Safety 2011). The Canadian best practices system is more stringent, calling for a minimum learner age of 16, learner holding period of 12 months, at least 50 practice hours, a 9 pm driving restriction in the provisional stage, no teenage passengers other than siblings, with night and passenger restrictions lasting at least one year, preferably two years (Mayhew, Simpson & Singhal 2005). With respect to age and timeframes at least, the IIHS model system is therefore more in keeping with the current system in New Zealand and the TIRF model with those in Australia.

There is some validation evidence for the IIHS model system, in that when states are rated in terms of its criteria (good, fair, marginal, poor; see footnote on page 3), states rated ‘good’ have achieved the greatest crash reductions (Dee, Grabowski & Morrissey 2005; Fell, Jones, Romano & Voas 2011; McCartt et al. 2010; Morrissey, Grabowski, Dee & Campbell 2006). However, the IIHS scheme, which has since been replaced, was not entirely based on science. For example, it took into consideration what states had done or were likely to do in the required minimum learner time (e.g. the six month learner period and the 30-50 hours supervision recommendations) and one passenger was permissible for the passenger restriction although the research evidence in the United States clearly indicated that one passenger substantially increased crash risk.

IIHS now alternatively provides states with a web-based GDL ‘calculator’, based on a national GDL evaluation (McCartt, et al. 2010), which allows users to estimate crash reductions that could be achieved in their state by strengthening requirements for the learner permit age, practice driving hours, licensing age, and night and passenger restrictions, via a simple drop-down menu interface on its website (see: www.iihs.org/laws/gdl_calculator.aspx). Ideally, if the gaps in Australasian evaluations identified in the current report could be filled, a similar tool could be developed to assist Australasian policymakers, as well as inform other relevant stakeholders, including young drivers and parents.
5. Effectiveness of GDL Components

Much of the detailed evidence for component effects comes from several US studies, most of which, because of data availability, have been based only on fatal crashes. Exceptions include a study by Baker, Chen and Li (2007) that included fatal crash data from 43 US jurisdictions, and police-reported crash data from 35 (an elaboration of an earlier study; Chen, Baker & Li 2006), and more recently Lyon et al. (2012) who explored fatal data for 15-17-year-olds from all states and Washington DC and police-reported injury crashes from 18 states. A study by Vanlaar, Mayhew, Marcroux, Wets, Brijs and Shope (2009) was based on fatal crash data from 46 US states, the District of Columbia, and 11 Canadian provinces. The Vanlaar results are not discussed because they include some unreasonable parameter estimates, e.g. an 88.5% decrease in fatality risk of 16-year-old drivers associated with a passenger restriction in the provisional stage; a 728.1% increase in risk from lifting the passenger limit if passengers are immediate family members.

The two fatality-only studies that are the most comprehensive and most recent were done by McCartt and colleagues (2010), and Masten and colleagues (Masten 2013; Masten et al. 2011). (Hereafter, these reports are referred to as ‘the McCartt study’ and ‘the Masten study’.) These studies are large and complex and used different statistical models that in some cases produced discrepant results. Both used Poisson regression to examine fatal crash involvements. The McCartt study used corresponding fatal crash rates of 30-59-year-old drivers to control for state- or time-dependent influences on crash rates unrelated to graduated licensing laws, including seasonal variables, economic trends, and other factors. The Masten study adjusted for a variety of potential confounders, including overall differences in state crash rates, seasonality, economic factors, and changes in per capita driving exposure. Notably, the Masten study had three classifications of evidence: clear, less clear, or none. Clear indicates that meaningful results in terms of fatal crash reductions were found for both 16-and 17-year-olds. Less clear, which can be interpreted as “some” evidence, indicates that crash reductions were meaningful for only one of the age groups.

A study conducted in parallel with the McCartt study was based on changes in collision claim frequencies per insured vehicle year, using data from the Highway Loss Data Institute (Trempel 2009). This is subsequently referred to as ‘the Trempel study’. Claim frequencies are dominated by relatively minor crashes and are based on licensed drivers, so the results are not due to any reduced exposure that accompanies the introduction of graduated licensing.

While the specifications for the present review focused only on the minimum supervised driving requirements for the learner stage, this is difficult to discuss in isolation of other elements, such as the minimum length of learner stage. For example, a six-month only period and 120-hour supervision requirement would be impractical (and unlikely to be accepted by the public). Therefore, the review first covers several elements of the learner stage: the minimum entry age, required learner holding period, requirements for the number of supervised driving hours that must be accumulated, and supervisory driver requirements.

Likewise, formal training and education requirements are also intricately linked into testing requirements. Therefore, these are also reviewed in relation to both the learner and provisional stages. Further, before reviewing several restrictions that primarily apply to provisional drivers, minimum provisional holding periods and the related minimum exit age are first explored. This is followed by the additional specified components: minimum provisional licensing age; night driving restrictions, including evidence for the optimal start time; passenger restrictions including evidence for number of passengers allowed; BAC limits; mobile phone and other technology restrictions; and high powered vehicle restrictions. Specific sanctions for speed, alcohol or other offences are next covered and, in relation to these, maximum speed restrictions and reduced demerit point thresholds.

5.1 Minimum Learner Age

There is developing consensus in GDL countries that 16 years is the appropriate minimum age to commence driving as a learner. In New Zealand, after years of efforts by safety groups (Begg & Langley 2009), the minimum age was raised to 16 in August 2011. The minimum age is 16 in most Australian and Canadian jurisdictions. Sixteen is also the learner age in a minority of US jurisdictions.
There is also some empirical justification for a learner starting age of 16. In the McCartt study, delaying the minimum starting age for a learner permit was associated with lower fatal crash rates for 15-17-year-olds. A one-year delay, from 15 to 16, reduced the fatal crash rate by 13%. The Masten study found that disallowing learner driving until age 16 had the most potential for fatal crash reduction, but the evidence was only suggestive. The Trempel study on collision claims was not statistically significant for this component.

While the above studies focused on raising the learner age to 16, Victoria, Sweden and Norway have all reported on impacts of lowering their learner age to 16 from a previous 17½ in Victoria and Sweden and 17 in Norway. In all cases, the provisional/independent driving age remained at 18 years. This change in Victoria, in 1990, was associated with earlier uptake of learner permits and increased learner driving experience (Catchpole & Stevenson 2001) but the impact on provisional driver crashes or injuries has not been quantified. For Sweden, this change in 1993 was associated with significant reductions in crashes, with an overall 15% reduction in crash rates (per 10 million km) (Gregersen, Berg, Engström, Nolen, Nyberg & Rimmo 2000). Conversely, in Norway, no change was effected, which was attributed to a lack of increase in supervised driving despite 54.5% gaining their permit earlier (Sagberg 2000). Therefore, the impact of setting an optimal minimum age for the learner period is somewhat interdependent with the minimum learner period (or minimum provisional age) and what driving experience is actually gained during that period.

Overall, this GDL literature, in addition to adolescent development literature (section 2.2) strongly identifies younger ages as too young to manage the complexity of driving in traffic and associates younger age (15 years) with increased fatality. Older ages do not allow for sufficient supervised practice as a learner before the proposed minimum provisional age; albeit further information and possibly incentives to utilise this period to gain maximum experience might also be needed.

### 5.1.1 Conclusions: minimum learner age

There is theoretical (road safety and neurobiological development) and empirical (crash, fatal crash and insurance claim analysis) evidence for a minimum learner age of 16 years. Expected benefits of a minimum learner age of 16 include:

- 13% reduction in fatal crash rates of 15-17-year-olds compared to a minimum learner age of 15.
- Up to 15% reduction in first year provisional driver crashes, compared to a minimum learner age of 17.5 with provisional licence at age 18.

### 5.2 Minimum Learner Period

The minimum learner period (coupled with supervised driving requirements) is intended to encourage practice driving in a protected environment. The range for learner period length in Australasia, as well as North America, is generally 6 to 12 months.

It is clear that longer periods for the learner stage can result in delays in later stages of licensing, with associated safety benefits. In the United States, several states have de facto raised the licensing age to higher than 16 through a combination of minimum permit age and required holding period. For example, a minimum learner age of 15½ and a six month holding period makes the licensing age 16½. This results in 16 year-olds spending more time in the low-risk learner stage than as a provisional licence holder. A 12-month holding period combined with current minimum permit ages would raise the licensing age in 23 states (Williams 2011). In similar fashion, a recent increase in the learner holding period in South Australia from 6 to 12 months has raised the minimum P1 age to 17 rather than 16½ years. The minimum learner period can therefore be set directly or be affected by raising the minimum provisional age.
5.2.1 Raising the minimum provisional age to extend the learner period for younger learners

The McCartt and Trempel studies found support for raising provisional licensing ages, thereby extending the learner period. In the McCartt study, delaying licensure by six months (e.g. from 16 to 16½) lowered the fatal crash rate among 15-17-year-olds by 7%; delaying it for a year (from 16 to 17) reduced the rate by 13%. In the Trempel study, a one-year delay reduced collision claims by 9% among 16-year-old licensed drivers. In the Masten study, delaying provisional driving until 16½ or 17 was associated with a 23% lower fatal crash incidence for 16-year-olds.

An early example in Australasia comes from South Australia (prior to the model in Table 1). In 1989 the minimum provisional licensing age was set at 16½ years, retaining a minimum learner age of 16 years with no minimum holding period (O’Connor & Giles 2000). This effectively raised the provisional age and increased the learner period for those who might otherwise obtain a learner period at the minimum age and seek a provisional licence soon after. This was however introduced together with raising the minimum full licence age from 17 to 19 years and introducing a zero BAC limit. Reduced fatalities and serious injuries were found among drivers in these age groups; however, it was not possible to determine which of the changes or which combination of the changes influenced the reductions.

5.2.2 Setting the minimum learner period

In terms of how permit periods of various lengths relate to crash involvement, the evidence is mixed. An early review by McKnight, Peck and Foss (2002) found that US jurisdictions that had introduced a minimum or extended the learner period to at least 6-12 months reported crash reductions ranging from 0-16% per licensee, 9-31% per driver, and 7-32% per capita. More recently, the Masten study showed clear crash reduction benefits of permit periods lasting 9-12 months. Longer learner permit lengths were associated with 26% lower fatal crash incidence for 16-year-olds, and 17% lower for 17-year-olds. The McCartt study indicated that apart from the effects of any associated delays in licensing, increasing the length of the permit period had little effect on fatal crashes. That is, after the effects of any related delay in licensing were accounted for, an increase in the minimum permit holding period showed no association with fatal crash rates. The Trempel study showed a small increase in collision claims associated with increases in the length of the permit holding period.

While these evaluations have largely focused on comparing 6 to 12 months, Victoria’s longer learner structure (from age 16 with P1 minimum age 18) provides an example of longer duration comparisons (VicRoads 2005). The relative casualty crash involvement of 18-year-old P1 drivers progressively decreased among those with longer learner durations (9-15, 15-24 and 24+ months) compared to 6-9 months only. The rate of involvement was less than 1.0 for those with 24+ months compared to over 1.5 for those with 6-9 months. In Sweden, where the same minimum learner and provisional licensing ages applied with a 6-month minimum learner period, those utilising the 24 months compared to only 6 months had a 24% reduction in crash rates (per 10 million km) in the first two years of independent driving (Gregersen et al. 2000). Nonetheless, when the same provisions were made in Norway, the 24-month learner period effected no change as it failed to increase the amount of supervised driving gained (Sagberg 2000).

In Sweden research also examined whether the extended exposure during the two-year learner permit period, and therefore the increased potential for crashes as a learner, was offset by the reduction in crashes in the two years post-licensure (Gregersen, Nyberg & Berg 2003). Without learner crash data available prior to the policy change, a cost-benefit approach was adopted. The cost was defined as the number of crashes per 1,000 learners aged 16-17 and the benefit as the reduction in crashes during the first two years post-licence (from the above Gregersen et al. 2000 study). The research showed that, relative to the learner period, crashes were 33 times more likely in the post-licence period or still 10 times more likely when accounting for increased driving exposure during this time. The overall cost-benefit was 30 times higher.

Further, the most recent evaluation of the 2007 changes to Queensland’s GDL, showed a significant 30% reduction in P1 driver fatal crashes; however, as other changes were simultaneously introduced with the increase in logbook hours (including a P1 night passenger restriction), the relative contribution of this change to the reduction is unknown (Newstead & Scully 2013). Nonetheless, it is still likely that the increase in logbook hours contributed to the 30% significant reduction in P1 driver fatal crashes that was observed.
5.2.3 Conclusions: minimum learner period

Research shows that sufficient time is needed to maximise both depth and breadth of experience as a learner driver before progressing to a provisional licence, so this component interacts with recommended minimum learner and provisional ages. Setting a minimum learner period can have benefits not only due to extended experience as a learner but due to delaying the transition to an independent provisional licence; with some research suggesting the latter might be the stronger explanation for fatal crash reductions once on the provisional licence.

Evaluations consistently show early provisional crash-reduction benefits of minimum learner periods of 6 months over none, and 12 months over 6 months. Findings were inconsistent for 24 months over 6 months. Such benefits were only found if the learner drivers used the extended period to increase their supervised driving hours. Note that no mandatory 24 month learner period applies, rather is allowable in some GDL models.

The range of potential benefits includes:

- 7% / 13% reduction in fatal crash rates of 15-17-year-olds when extending by 6 / 12 months (by raising the P driver age).
- 9% reduction in collision claims of 16-year-olds when extending by 12 months (by raising the P driver age).
- 0-16% reduction in crashes per licensee, 9-31% per driver and 7-32% per capita when setting minimum of 6-12 months.
- 26% / 17% reduction in fatal crashes of 16 / 17-year-olds when setting minimum of 9-12 months.
- 50% lower casualty crash risk for 24 months compared to 6-9 months for 18-year-old P drivers.
- 0-24% lower crash risk for 24 months compared to 6 months for P drivers.
- A potential small increase in collision claims and crashes during the learner period, offset by a benefit-cost ratio of 30 for reductions in provisional crashes for a 24-month learner period with minimum 6 months.

5.3 Minimum Supervised Hours

Requirements for supervised driving hours (together with minimum learner periods) are intended to encourage practice driving in a protected environment. The range of minimum hours in Australasia and North America varies widely. In North America, 40-50 hours is the norm, while in Australasia a minority have no minimums (i.e. ACT, NT, NZ), while others range from 50 hours (i.e. WA) to 120 hours (e.g. VIC). Therefore, evaluations concerning hours are inconsistent in the amount of hours compared, with no one ideal study conclusively comparing small, to moderate to large amounts. Further indicative evaluations in Europe are also available from countries that include options for minimum supervision in terms of mileage (or ‘distance travelled’), rather than hours and in lieu of longer learner periods with mandatory professional training.

5.3.1 United States Research

Early US research gave some indication that requiring 50 hours of supervision compared with none increased the amount of driving (including beyond 50 hours), although these studies were based on retrospective self reports rather than stronger, more objective research designs (Waller, Olk & Shope 2000; Williams, Nelson & Leaf 2002).
The more telling indicator of benefits however is the extent to which hour requirements relate to provisional crash involvement. Foss, Masten, Goodwin and O’Brien (2012) conducted a cross-sectional study comparing states in terms of their various mandated hour requirements, taking into account other licensing system elements, other traffic safety laws, population, and economic conditions. No relationship was found between required hours and fatal crash rates of 16-17-year-olds. Further, the effect of mandating 30 hours of supervised driving, implemented in Minnesota independent of any other GDL features, indicated no effects on the fatal crashes of 16- and 17-year-olds. These findings are tempered by the fact that surveys of parents in five states indicated that only about one-third claimed to be aware of the number of required hours in their state (O’Brien, Foss, Goodwin & Masten 2013). Therefore, lack of compliance could underlie the lack of significant findings rather than a lack of impact of increased supervised hours.

In the McCartt study, an increase in the number of practice driving hours required did not have an independent association with fatal crash rates. In an earlier longitudinal study based on self-reported data, no relationships were found between mileage in the learner phase and crashes and citations in the early months of licensed driving (McCarrt, Shabanova & Leaf 2003). Masten found no clear evidence that the number of required hours made any difference and concluded that not requiring any minimum number of supervised driving hours is as effective as requiring any particular number.

However, two studies indicate some support for supervised hour requirements. The Trempel study found that increasing the number of required hours by 20 was associated with a statistically significant reduction of 7% in insurance claims for 16-year-olds, and a 40-hour increase produced a 14% reduction. The national study by Chen et al. (2006) found an 18% reduction in fatal crashes of 16-year-olds attributed to the requirement for 30 or more hours of supervised driving compared to none or fewer hours.

The mixed results for these studies of the relationship between mandated hours and crashes might reflect in part the difficulties in teasing out any effect of this policy, particularly independent of the learner period duration and provisional licensing age. It also might be that the 40-50 hour range present in North America does not represent enough practice driving to affect crash rates, whereas difference might be more evident when comparing these to the 100-120 hour requirements in Australia.

5.3.2 Australian Research

Similar to the early US research, preliminary Australian retrospective self-report research also found that a 50-hour minimum compared to none resulted in a higher number of hours gained on average (Bates, Watson & King 2010). However, the research also indicated that the 50-hour minimum appeared to limit those who might otherwise have acquired even more hours. Bates et al. (2010) compared the distributions of self-reported experiences of small samples in Queensland, when no minimum hours were required at the time of data collection, and in NSW, where 50 hours were required. NSW responses peaked between 51-75 hours (around 60%), while, QLD responses showed a bimodal distribution at 26-50 hours and 100+ hours (each around 30%). While small non-representative samples were compared, the results suggests that 50 hours might well raise the hours of those who would otherwise achieve less, but might also limit those who might otherwise achieve much more.

Subsequent to this research data being collected, Queensland introduced 100 hours and NSW 120 hours of supervision requirements. Recent analysis in NSW compared pass rates on the practical driving test of learners requiring 120 hours to those previously requiring only 50 hours (Roads and Traffic Authority of NSW 2009). The practical test was specifically revised at that time to be more challenging in keeping with the increased supervised hours requirement (an important example of where GDL components can interact and should be simultaneously considered when implementing changes). Even though the test was more challenging, the 120 hour group showed increased pass rates at about 5 percentage points higher than the 50 hour group, evidence of superior driving skills, likely to lead to lower crash rates. Likewise in Victoria, improved performance on complex tasks of the practical driving test showed incremental improvement for those acquiring an average of 82 hours compared to 69 hours, and even more marked improvement for those acquiring 132 hours (Cavallo & Oh 2008). Recorded experience driving in complex conditions was shown to increase markedly after 110 hours. Moreover, NSW has experienced a 40% reduction in provisional driver fatal crashes since the change (Audit Office of New South Wales 2011); however, as this measure was introduced with other initiatives, the relative contribution of the 120 hour requirement is unknown.
Some small indicative studies were also published on Queensland’s GDL when supervised hours changed from none to 100 hours in July 2007. A ‘3-for-1 scheme’ was simultaneously introduced, where one hour with a professional driving instructor could count as three hours for a maximum of 10 on-hour lessons; thereby introducing potential for the 100 hour minimum to reduce to 80 hours (Scott-Parker, Bates, Watson, King & Hyde 2011). Self-report research conducted with over 1,000 young drivers in QLD compared experiences of those licensed under the new requirements to those licensed prior (Scott-Parker et al. 2011). Those under the new scheme (n=183) reported a longer learner period duration (16.5 months up from 12.4) and amount of supervised driving (92.4 hours up from 63.3) than those in the former scheme (n=149), with no statistically significant difference reported in the amount of professional lessons obtained (9.8 hours vs 11.5 hours) or unsupervised driving reported (10.1% vs 16.9%). While favourable in direction, no significant differences were found in the number of driving tests attempts (1.3 vs 1.5, respectively) or proportion passing driving tests on first attempt (68.2% vs 61.5%).

Further, the most recent evaluation of the 2007 changes to Queensland’s GDL, showed a significant 30% reduction in P1 driver fatal crashes; however, as other changes were simultaneously introduced with the increase in logbook hours (including a P1 night passenger restriction), the relative contribution of this change to the reduction is unknown (Newstead & Scully 2013).

Notably, no clear conclusions regarding the 120 hours requirement in Victoria could be extrapolated from a recent preliminary evaluation of Victoria’s GDL (Healy, Catchpole & Harrison 2012). As 120 hours had been promoted for many years prior, 16-year-old learners were already achieving over 120 hours on average prior to the GDL requirements and this remained stable following the requirement; therefore, pre-post-GDL changes could not be attributed to the 120 hours per se for this age group. Nonetheless, for ‘older’ learners, aged 17 and 18, hours did increase substantially (from about 58 and 69 hours, respectively, of private supervised practice prior to the changes to 99 and 109 hours respectively, after the changes). This might have contributed to the reported crash benefits: reductions were found in the order of 31% of fatal and serious injury crashes and 23% of all casualty crashes in the first year of provisional licensure; however, this requirement was introduced with several other changes and analyses were not conducted separately by age at learner licensure. Nonetheless, when removing crashes with multiple peer passengers (a known effective component of the GDL changes – see 6.10), the reduction in casualty crashes was still significant (16%), strengthening the possibility that 120 hours might have contributed to the reductions.

### 5.3.3 European Research

In 1993 in Sweden, the permit age was lowered from 17.5 years to 16 years to give learner permit holders more time for supervised practice. The licensing age remained at 18 years. In an evaluation of this reform (Gregersen 1997; Gregersen et al. 2000) it was found that there was an overall reduction in young novice driver crashes per 10 million kilometres driven of approximately 15%. When comparing the effect of the initiative on those novice drivers who made use of the longer period to those who did not, the reduction in crash risk was about 40%. Approximately half of the novices in the population were found to make use of the extended period, suggesting additional safety benefits were more learner drivers to have capitalised on the lower minimum age (Gregersen et al., 2000). The difference in the amount of practice was 2.5 to 3 times greater, with those learner drivers who made use of the extended period accumulating, on average, 118 hours of supervised practice and those learner drivers who did not make use of the lower minimum age accumulating, on average, 41 or 47 hours of supervised practice (Gregersen, 1997).

It is noteworthy however that this policy was introduced in the midst of an economic recession. Crash rates did decrease, but the licensure rate also decreased during this period (Preusser & Tison 2007; Williams 2007).

More recently in Europe, rather than a focus on minimum supervised driving hours, various countries have instead introduced optional licensing paths for learners who choose to undertake minimum distances travelled under supervision (Twisk & Stacey 2007). In the countries offering this option, the minimum learner age is typically 16 and provisional age 18. The supervised driving option is typically offered following completion of a standard driver education and training course that all learner drivers must complete. Those choosing to register a supervisor and complete the minimum specified kilometres can be provisionally licensed from age 17. Examples include a 1,000 km option in Finland, 3,000 km in France and Austria, and 4,000 km in Sweden.
Evaluations of these options focus on comparing crashes of those who select these options and therefore must achieve these minimum kilometres of lay supervised experience – without evaluating the specific number of kilometres achieved per se – versus those not selecting this option and therefore only completing the required professional courses with no lay supervised driving allowed. Full compliance with the minimum kilometres is assumed given detailed registration and documentation requirements.

Analysis of crashes per 1,000 drivers and personal mileage at time of crash in Austria showed a large 50% reduction in crashes for those opting for the 3,000 km supervision compared to those who did not choose this option; however, only 8% of learners chose this option (Twisk & Stacey 2007). Contrastingly, in France, where 3,000 km was also the minimum, no benefit was determined, assessed to be largely due to a lack of variation in the experience gained and the supervisor continuing to manage demanding driving tasks throughout the learner period, such that these were not sufficiently transferred to the learners in order for them to manage them on their own once independently licensed (Page, Ouimet & Cuny 2004).

Alternatively, Germany offered a supervision option in 2005 in lieu of the professional instruction course without specifying minimum kilometres or allowing reduced time on the learner permit (a minimum age of 18 for licensure applied to all learners). A 2010 evaluation found 40% of learners chose this option and, compared to other learners, subsequently self-reported both fewer traffic offences (15% or 20% adjusting for kilometres travelled) and fewer crashes (17% or 22% adjusted) (Willmes-Lenz, Prucher & Grosmann 2010). Based on self-reported average kilometres driven on weekdays and weekend days, it was extrapolated in the study that the average kilometres driven over 12 months was 3,800 km.

In Norway in 2002, an evaluation report on optimal supervised distance travelled was released with only an English summary and with limited details on methods, but reported on statistical projections based on self-reported data of approximately 30,000 drivers linked to police records of crashes (Sagberg 2002). The modelling sought to calculate the optimal range of supervision that would balance out the risk of increased crash during supervised driving (due to increased exposure) against the decreased risk of crash during the first year of independent driving; therefore the optimal range that would affect the largest decrease in overall crashes during the learner and first-year provisional period. The author concluded that the optimal range of supervised experience was between 5,000 and 7,000 km. Therefore, any less than this as well as more than this was associated with greater net crashes.

UK research has also demonstrated that there is an optimal level after which the benefit of further training is diminished, although quantifying such a level was dependent both on the initial ability of the individual and that individual’s rate of learning (Groeger & Brady 2004). While the amount and nature of supervised practice undertaken was among the predictors of the rate of learning (as well as intellectual ability and personality factors), the research did not quantify an average range of hours or distance travelled to achieve this optimum level.

5.3.4 Balance of Evidence Regarding Number of Hours

Collectively these studies suggest that regulating hours of required supervision does not necessarily ensure that the quality of experience gained will be sufficient to be protective of subsequent crash involvement. Nonetheless, the variation in the amount of supervision regulated suggests that higher than the current average of 50 hours is more likely to be more protective.

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5 Note however, the majority of these 17-year-olds delayed enrolling for some months such that the average duration of the accompanied learner period (prior to licensure during age 18 years) was only between seven to eight months, with one-quarter having a duration only up to five months and the quarter with the highest duration up to eleven or twelve months.
It is difficult to extrapolate the European findings on kilometres travelled into driving hours for the Australasian context. This would vary greatly for example in rural areas, where speeds are higher and distances could be covered in shorter durations, compared to urban areas, where lower speed zones and congestion would increase durations. For illustration purposes however, two suggestions are considered here: one for an average speed of 50km/h and one for an average speed of 60km/h over the distances travelled (Christie 2012; Young et al. 2013). Applying these speed estimates to the optimal distance travelled range of 5,000 to 7,000 km (Sagberg 2002) would equate to a minimum of about 80 to 100 hours to a maximum of about 120 to 140 hours. This is a similar range to the 80 hours (with 3-for-1 scheme) minimum in Queensland and 100 hours minimum in NSW with their 3-for-1 scheme, to the 120 hours minimum in Victoria.

The evidence for a specific optimal number of supervised hours is therefore inconclusive, although more appears better than less, at least perhaps up to the 7,000 km (rounded estimate 120-140 hours) threshold reported in Norway, with at least 80 hours preferable over 50 hours as a minimum. It should be noted, however, that if a high number of hours such as 80-120 is required, benefits might also result simply as this might serve to delay provisional licensing, especially when the permit period is 12 months or less; thereby contributing to crash reductions due to older age at licensure and reduced numbers of independent drivers at the minimum licensing age (i.e. not solely due to greater skill development per se).

Further, benefits of private supervised practice (typically required to meet the requirement) as compared to professional instruction, include more variation in the driving experience gained, including driving: at a wider variety of times of day, including substantial more driving in darkness; on a wider variety of road types; at a wider variety of speeds; for a wider variety of trip durations; and in unusually inclement weather (Groeger & Brady 2004). Recent Norwegian research concluded, however, that private training might not extend to the more challenging aspects of driver training and that a combination of extensive private supervision with some professional training is likely to be optimal (Tronsmoen 2011).

5.3.5 Compliance with Supervised Hours Requirements

Consideration of the minimum number of supervised driving hours that should be mandated needs also to take into account the likely level of compliance in the given jurisdiction. Optimal effects might not be achieved if the amount of hours set is viewed as unachievable or unreasonable so that compliance is unduly compromised. Recent research in Victoria found that the 120 hours requirement was achievable, although the youngest learners aged 16 years were most compliant, while learners aged 17-20 were less compliant (Healy et al. 2012). Two additional Australian studies have also explored the accuracy of logbook recordings of supervised hours from different perspectives, with both reporting a high level of accuracy (Palamara 2007; Scott-Parker et al. 2011).

Palamara (2007) assessed a random sample of 41 logbooks in Western Australia, when 25 hours of supervised driving was required. The assessment was limited to determining the consistency and completeness of the details required for each supervision entry and the completion of the various declarations required before submission. The logbooks, comprising 1,866 trips, were found to be internally accurate. Various assessments showed most odometer readings were consistent and witness details appropriate. Calculations of trip times by average speeds and trip distances were deemed accurate as well as total hours recorded, with all at or above 25 hours in total.

Scott-Parker et al. (2011) examined truthfulness of responses via self report of 1,032 learners in Queensland, where the mandated minimum was much greater at 100 hours. In total, 96% reported either entirely accurate or rounded up entries in their logbooks (83.4% and 12.6% respectively). Only 4% reported that they had included extra hours. While this was a non-representative sample, the indication is that the majority of learners do aim to meet the minimum supervision requirement, even at high levels such as 100 hours.
5.3.6 Requiring Supervised Hours at Night

The effect of requiring some of the learner hours to be spent driving at night, as is the case in several North American jurisdictions as well as Australasia, has not been specifically evaluated within GDL. Nonetheless, crash risk increases at night for all drivers but, compounded with inexperience, is even greater for novice drivers, with recreational night driving particularly risky (see e.g. Senserrick & Whelan 2003).

Some support for including this requirement for learners can be drawn from early research in Norway when a driving course at night or in darkness was made compulsory, albeit for newly-licensed independent drivers rather than learners (Glad, 1998). The research is often cited in relation to the simultaneously introduced requirement of skid-pan training, which led to increased crash risk. Less attention has been given however to the finding of significantly lower crash rates at night or in darkness driving following the “Dark Driving Course” (Glad 1998), most clearly demonstrated for young males. The specific number of hours undertaken at night and the quantified benefits were not specified.

Additional support can also be extrapolated from Lyon et al.’s (2012) recent US national evaluation of strong, moderate and poor learner stages (based on minimum age, minimum holding period and mandated hours – irrespective of night hours required; see footnotes on pages 12-13). They found significant decreases in night-time (11 pm to 6 am) crashes for 16-year-olds in states with stronger learner systems, with the effect even stronger than for overall crash comparisons. As the criteria for strong mandated hours was based on a 30+ hours requirement and as most of these requirements include some specified night-time hours (mostly 10 hours, see Appendix 1), it could be postulated that some of the impact on reduced night crashes was due to the supervised night-time driving requirement.

5.3.7 Conclusions: Minimum Supervised Hours

Low levels of supervised hours result in less varied and less complex experience, particularly if solely by professional lessons, with this complexity of experience likely required to effectively reduce crash risk as a provisional driver. The optimal number of hours to set is inconclusive although the typical average of 50 hours is likely to preclude more complex driving experience and, while increasing experience for those who might otherwise gain less, can reduce experience for those who might otherwise gain much more. At minimum, a high number of hours will increase time as a learner and potentially increase age at provisional licence, thereby having protective effects from these aspects if not by improved skills.

In terms of improved skills and crash risk however, the optimal threshold is likely to be between 80-100 hours (or 5,000 km) and 120-140 hours (or 7,000 km), during which the increased experience gained outweighs the increased risk of crash due to increased exposure; this is largely derived from modelling analyses, however, the research referred to shows an improvement of skills and crash risk for more supervised driving hours. There is more consistent evidence that the higher the number of hours, the more experience in complex driving conditions and the higher the pass rates on practical driving tests. Experience driving at night or in darkness is likely to be particularly important but again the ideal number of hours in unknown.

Findings in relation to potential crash-reduction benefits when introducing minimum hour / kilometre requirements include:

- 7% / 18% additional reduction in insurance claims for 16-year-olds for increases of 20 / 40 hours compared to less or none.
- 18% reduction in fatal crashes of 16-year-olds for 30+ hours compared to less or none.
- 17-22% reduction in 18+-year-old provisional driver crashes for ~80 hours compared to professional courses only.
5.4 Supervisory Driver Requirements

North American requirements for lay supervisory drivers generally include age and licensure criteria. The Canadian best practices model suggests that the supervisor be at least 25 years of age and fully licensed for at least one year. The IIHS has no recommendations for US jurisdictions and there is no relevant research.

In several European countries, private supervision is only possible by registering the supervisor (e.g. France, Germany and Sweden). Requirements are typically stringent, such as a minimum age of 30 and a 3-year offence-free period in France. There are likewise no evaluations comparing the relative merits of such requirements relative to less stringent requirements.

NSW research has shown that first-year provisional drivers whose main supervisory drivers had offences in the previous 12 months had an increased risk of a police-recorded crash over a two-year follow-up period (Senserrick, Boufous, Ivers, Stevenson, Norton & Williamson 2010). The increased risk was no longer statistically significant however after controlling for the provisional drivers’ demographics and characteristics, which could account, for example, shared socioeconomic status of the supervisor and learner or proneness or aversion to risk. The evaluation did not separate serious moving violations from other offences, which might further inform this issue in the future.

An important issue to legislate for supervisory drivers, albeit also not evaluated, is a BAC limit. This is because the supervisor must be sober enough to actually supervise the learner. This prevents inexperienced learners being able to be a ‘designated driver’ for alcohol-affected passengers. Some Australian jurisdictions have set this BAC limit as <0.05% (NSW, QLD, VIC) (Senserrick 2009) while in the ACT it is zero. For professional instructors a zero limit is typically required in Australasian jurisdictions.

While no evaluation of optimal supervisory driver requirements therefore exists, it is particularly important to consider the minimum age in relation to the substantial body of literature demonstrating increased crash risk for young peers travelling together, with restrictions most commonly applying for passengers aged under 21 years (see section 6.10 on passenger restrictions). Full licensure further ensures supervisors are no longer novices, which is particularly important when young, although European research demonstrates that by age 25 and older, much of the extreme young age effect on inflated crash risk as a new provisional driver has diminished (see e.g. Twisk & Stacey 2007). Therefore minimum age requirements for supervisors can also potentially control for their inexperience.

5.4.1 Conclusions: Supervisory Driver Requirements

Research is only developing to suggest requiring a full licence and age 25 (as recommended in Canada) would ensure supervisors are not young inexperienced peers of the provisional driver and that a zero or at least <0.05% BAC should apply; however, there is no evaluation evidence for this GDL component. Research is only developing on whether having supervisors with recent traffic offences might contribute to the young drivers’ future crash risk. Due to the lack of evaluation, potential quantified benefits of any supervisor requirements are unknown.
5.5 Mandatory Formal Education Requirements

5.5.1 Mixed Pre-learner and Learner Education Programs

There is scant evaluation research on pre-learner education programs. The Australian Capital Territory provides one example with its mandatory Road Ready program for pre-learners and learners (Steer Davies Gleave 2004). The classroom-based program commences with pre-learners (under minimum learner age of 15 years 9 months) and their parents. A second module targets those 15 years 9 months and older to prepare for the learner knowledge test. A third module is also conducted in the learner phase (and optional fourth module in the provisional phase). Persons unable to undertake the Road Ready course through their school are required to complete the course through other providers before gaining their learner licence. Resources are also provided to parents (Preparing Your Pre-Learner for Driving) in advance of the classroom program, and learners undertake driver training with driving instructors or supervisory drivers. A 2004 self-report evaluation found Road Ready participants gained their learner licence at a slightly earlier age, but held it for longer in comparison to a control group (more often 13-18 months vs. 6-12 months), suggesting some benefit due to a delay in provisional licensing (Steer Davies Gleave 2004).

A new behaviour change approach is education that focuses on building resilience among youth, not necessarily specifically focused as a ‘driver education’ program (Griffin, Botvin & Nichols 2004; Senserrick, Ivers, Boufous, Chen, Stevenson, Norton 2009a). The school-based examples occur at a time when most of the student participants are nearing or at the eligible learner age (10th Grade in the US, Year 11 in NSW). Griffin et al. (2004) used the randomised trial study design to evaluate outcomes of a resilience-focused program arising from a drug and alcohol initiative in the United States. Despite not being focused on driving per se, program participants had fewer traffic violations and demerit points recorded against their driver licence by 12th Grade compared to controls. In NSW, the Reduce Risk Increase Student Knowledge (RRISK) is an example of such a program, which includes safe driving among other topics (Senserrick et al. 2009a). The 2009 evaluation found provisional drivers in a large, non-representative cohort study who had undertaken the program 2-3 years previously were less likely to be involved in police-reported crashes as a driver, although no difference was found in involvement in offences compared to those who had not participated.

Both programs included education not solely on understanding risks, but rather on strategies to avoid or effectively manage such risks. The programs include components beyond a one-day focus and involve the wider community. These features are in keeping with long theorised best practice (Mayhew 2007; Senserrick & Haworth 2004; Williams 2006) and therefore show considerable promise. In contrast, the Senserrick et al. (2009a) evaluation also explored outcomes of an earlier version of the Rotary Young Driver Awareness (RYDA) program, and found this one-day only driving-focused program showed no association with crash reductions. The program has since been expanded to include additional modules but has not yet been evaluated.

5.5.2 Learner Driver Education Programs

Driver education is mandatory in many US jurisdictions for licensing prior to age 18. It is voluntary in other states and in most Canadian jurisdictions. Traditional forms of driver education focus on classroom-based education on risks, and an in-vehicle training component, with both components typically conducted through schools. These traditional programs have not been found to reduce crashes, but for many they are the preferred way to acquire basic operating skills and to learn the rules of the road and are linked to passing licensing tests (Clinton & Lonero 2006; Mayhew 2007; Peck 2011; Roberts, Kwan, Cochrane Injuries Group Driver Education Reviewers 2004; Woolley 2004).
Programs that teach GDL rules and the rationale for them are also encouraged in North America, as well as programs that in some way involve parents or others who will be providing most of the supervised driving instruction and could benefit from input from professional instructors (Simons-Morton & Ouimet 2006). In Australia, it has also been proposed that some parents might benefit from education strategies to reduce the level of stress associated with their role as supervising drivers, which could increase the hours of supervised driving they provide (Harrison 2003). The national keys2drive initiative in Australia provides an Australian example of a program aiming to increase understanding of GDL and to involve parents (Senserrick & Mitchell 2013). The initiative provides a free professional driving lesson to learner drivers if their main supervisory driver accompanies them, with the intention to increase their joint understanding of GDL and their role in helping reduce crash risk during the learner period and first six months of the P1 period. Results of a recent preliminary assessment suggested participants’ self-reported involvement in both offences and crashes during both the learner and provisional stages was lower than in other somewhat comparable self-report studies, but as the study designs differed, further evaluation is required to confirm and quantify these findings (Senserrick & Mitchell 2013).

‘Time discounts’ for driver education, allowing for an earlier start or abbreviated time under GDL programs, violate the concept of graduated licensing, which is based on a staged approach, involving adequate time in each stage. There is no justification for them in terms of driver education effectiveness. Moreover, a recent review of evaluations points out that time discounts have been shown to have negative effects (reviewed in Mayhew 2007).

Additional to these course-based programs, there is increasing evidence that certain computerised training programs can improve certain cognitive-perceptual skills known to be deficient in novice drivers. Improvements in ‘hazard perception’ search strategies have been demonstrated for learners and/or provisional drivers in Australia (Regan, Godley & Triggs 2000), New Zealand (Isler, Starkey & Williamson 2009) and the United States (Chan, Pradhan, Pollatsek, Knodler & Fisher 2010), including on-road (Pradhan, Pollatsek, Knodler & Fisher 2009). Whether training to improve hazard search and detection skills also improves recognition and responses, such that crashes are reduced, is yet to be determined.

5.5.3 Provisional Driver Education Programs

Most evaluated programs for provisional drivers focus on advanced skill training; however, the ACT provides an exception with its optional Road Ready Plus or P…Off education program. The program targets drivers from age 17 years after a minimum of 6 months on their provisional licence. Completion results in removal of the requirement to display P plates and an increase in the demerit point threshold from 4 to 8 points. The group-based program includes facilitated small group discussions around the experiences of driving. An early evaluation study that explored comparisons to a control group (provisional drivers not opting to undertake the program) found little difference in self-reported attitudes and behaviours following program participation (Di Pietro, Hughes & Catchpole 2004). Program participants were more likely to have already attracted more demerit points prior to the program (likely a result of the higher demerit threshold incentive) and continued to attract more points following participation. There was some indication, nonetheless, that program participants had fewer crashes (51 crashes of 200 participants vs. 75 crashes of 209 controls), including injury crashes (1 vs. 5 respectively) following the program, although no significance testing was reported. The researchers concluded that the program provides at least some support for those who have acquired demerit points and who could therefore benefit from some additional insights into their driving.

Another education program that has been trialled for inclusion in US GDL models is the Checkpoints program. This initiative encourages young drivers and their parents to complete and sign a formal driving agreement based on their own agreed restrictions and requirements during the early provisional period. A review of this work (and other such initiatives: Scott-Parker, Soole, Buckley, Senserrick & Watson 2012) found the program increased limit setting and greater discussion and awareness of driving risks and the need for such limits, particularly in states with strong GDL models. However, evaluations demonstrated only modest differences in traffic offences, and only one of several randomised control trials found positive impacts on crash involvement (i.e. reductions) (Simons-Morton, Hartos, Leaf & Preusser 2006).
Provisional Driver Training Focused Programs

Besides the cognitive (predominantly hazard perception) training programs cited above, most provisional training-focused programs centre on advanced driving skills. Despite measures such as extended learner periods and supervised driving hours, not all new provisional drivers will have extensive experience of the full range of driving experiences they will face once driving independently (Twisk & Stacey 2007). Driving without supervision is also fundamentally different and it is unlikely any education or training program, including simulator based, can fully prepare new drivers with the safe driving skills needed to protect them from crashes.

Traditionally programs for provisional drivers have focused on skills for emergency situations, such as skid correction training, emergency braking and controlled steering. However, numerous evaluations confirm that such programs can actually increase subsequent crash risk (Glad 1988; Jones 1994b; Keskinen, Hatakka, Katila & Laapotti 1992; see also reviews: ADVANCED 2002; Engström, Gregersen, Hemetkoski, Keskinen & Nyberg 2003 and meta-analysis: Ker, Roberts, Collier, Renton & Bunn 2003). This has been attributed to the trained drivers taking on more demanding tasks, no longer avoiding difficult conditions and accepting higher travel speeds in such circumstance – not speeding per se but not slowing down as much as they would otherwise (Katila, Keskinen & Hatakka 1996).

Due to such compelling research findings, Norway ceased skid training in 1994, while elsewhere in Scandinavia, as well as Central and Eastern Europe, there has been a shift in the use of skid-pans away from ‘advanced skills’ training to ‘defensive skills’ training (Mynttinen, Gatscha, Koivukoski, Hakuli & Keskinen 2010). These programs emphasise hazard anticipatory skills and crash avoidance by demonstrating how small increases in speeds and decreases in following distances heighten the risk of loss of control of the vehicle. Since such changes there have been some examples of decreases in crashes, else no change but no counterproductive findings (Mynttinen et al. 2010). Most promising findings are the recent crash-based evaluations reviewed by Washington, Cole and Herbel (2011). They reviewed studies that attempted to account for other country-wide factors that could impact on crashes by exploring percentage reductions among novice drivers greater than those achieved for the general population or for older, more experienced comparison groups. They found Austria had experienced a 9% reduction in novice driver crashes and around a 5% reduction in fatal crashes over five years. Finland had experienced a 7% reduction in crashes over six years, including a 23% reduction in slippery road crashes. In Luxembourg, where crash numbers were low relative to other countries, crashes reduced by about 13%. Denmark also experienced a 7% reduction in crashes among first year drivers.

5.5.4 Education on Safe Vehicles for Young Drivers

Research in Australasia and elsewhere has shown that young drivers often drive less safe vehicles. Young drivers tend to drive smaller cars that provide less crash protection and to drive older cars that lack many of the safety features of modern vehicles, such as multiple airbags and electronic stability control (Arup Transportation Planning 1995; Cammisa, Williams & Leaf 1999; Keall & Newstead 2010; Williams, Leaf, Simons-Morton & Hartos 1999; Williams, Preussser, Lund & Rasmusen 1987). Certain vehicles have a higher risk of occupant injury, such as four-wheel-drive models, which are more prone to rollover crashes and are typically not recommended for young novice drivers (Whelan, Scully & Newstead 2009). Recent modelling research in Victoria that explored vehicle crashworthiness by age and gender groups confirmed this differential risk, although also found this varied by gender (Watson, Newstead & Scully 2009). The research found compact four-wheel-drive vehicles ranked worse in terms of reducing injury risk for drivers aged 25 years or younger compared to drivers over 25 years overall, although there was a gender interaction in that for young females drivers a poor ranking (2/12) was achieved while for young males a good ranking (10/12) was achieved.

Parallel crash-based evaluation research based on Australian and New Zealand data was also able to demonstrate reductions in young driver fatalities and injuries if they were able to drive safer model cars based on three different scenarios (1) all young drivers were driving either a vehicle with the best crashworthiness rating or one of the ten most crashworthy; (2) all drove the most crashworthy vehicle of the same year of manufacture either within any market group or the same market group; and (3) all drove vehicles equipped with electronic stability control (Whelan et al. 2009).
Informed choice of a vehicle is therefore particularly important, not only for young drivers, but for their parents, who often either share a family vehicle or purchase a vehicle for the young driver (CHOP & State Farm 2007; Keall & Newstead 2013b). In recent years, self-report research on ratings of vehicle choices (rather than actual vehicle choice) in North America consistently include safety and reliability as the highest rated features, including by young drivers and their parents (Hellinga, McCartt & Haire 2007; Vrkljan & Anaby 2011). Moreover, research in Sweden and Spain based on actual vehicle choice also included these as the top two features (Koppel, Charlton, Fildes & Fitzharris 2008). Despite these findings, this is not being reflected in the crash fleet so purchases might also be influenced by other factors including cost and self-image (Johansson-Stenman & Martinsson 2006; Keall & Newstead 2010). In one study an interaction effect of age and gender was also found (Vrkljan & Anaby 2011). While young people (aged under 25 years) still highly valued safety, the younger the driver the less important safety was rated. Young male drivers rated safety the lowest, while all female age groups rated it the highest and relatively constantly across the life span. Among male drivers, safety gradually increased in importance with age.

Authors have recommended better education on vehicle choices, such as ready options to identify the safest (most crashworthy) vehicles within similar price or age ranges (Keall & Newstead 2010). No specific education program focusing on vehicle choices was identified however, nor evaluations of the effectiveness of including modules on vehicle choices within broader education programs.

5.5.5 Conclusions: Formal Training or Education

Given the significant role of inexperience in young driver crashes there is potential for education and training to play an important role in GDL models. What is best and when to implement it however remains somewhat unclear. Evaluations suggest one-off formal training or education programs for learners or provisional drivers focused solely on knowledge of risks, changing attitudes towards risks and/or providing basic vehicle handling skills are not effective in reducing crashes. Further evaluations of advanced driving skills training, particularly skid-correction training, show clear counterproductive outcomes.

There is evidence young novices have important cognitive skill deficits relative to experienced drivers, such as hazard perception, attentional control, time sharing and calibration. There is growing evidence that training programs can be developed to improve these skills among learners and early provisional drivers; however, not yet evaluations regarding the impact of such training on crash involvement. There is some limited indication that education programs on GDL that include parents as well as the young drivers at the learner or early provisional stage could have potential to impact on crashes but the results are inconsistent. Including education for both parents and young drivers on safer vehicle choices might also offer more protection should crashes occur, but no specific program or evaluation to confirm this was identified.

A more recent approach is education that focuses on building resilience among youth generally, including attention to driving risks among other youth risk taking (such as alcohol and other drug use). The limited research available suggests the approach might reduce risky driving but further evaluations are needed, particularly in relation to the potential to reduce crash involvement.

Due to inconsistencies, poor study design or lack of evaluations, no quantifiable benefits are suggested.

5.6 Licence Tests

Intricately related to education and training is the issue of licence tests, as these are viewed as a ‘motivator’ for undertaking voluntary programs (Emersen 2008) and the traditional end point to which the education and training is aimed; albeit safe driving is anticipated if both the education and tests are completed successfully. Research regarding this assumption is however mixed.

Many of the studies discussed below demonstrate lower crash rates for those who pass their licence test on the first attempt, compared to those who pass on later attempts. However, there is much less evidence on the impact of introducing licence tests, comparing outcomes for one group that was subject to licence testing to another group that was not.
5.6.1 Theory/Knowledge Test

Knowledge or theory tests typically focus on the roads rules and are typically mandated when applying for a learner permit. They are often in the form of multiple choice questions, with a number of different versions or random selection of questions. Assessments in the UK and wider European Union have found many such tests have psychometric problems pertaining to validity and reliability (Baughan & Simpson 1999; Jonsson, Sundström & Henriksson 2003).

An early French study found those who passed the theory test on the first attempt had lower crash rates in each of their first three years of unsupervised driving than those who needed more than one attempt (Maag, Laberge-Nadeau, Dionne, Desjardins & Messier 1999). Otherwise there has been little association between passing the test and positive attitudes, or actual driving performance (Baughan 2000; Macdonald 1988; Simpson, Chinn, Stone, Elliot & Knowles 2002; Torpey 1988).

5.6.2 On-road Driving Test

The on-road driving test is typically mandated for provisional licensure in Australasia, although in Western Australia it is situated part-way through the learner period and in the ACT and South Australia a competency-based training and assessment option is also available in lieu of the on-road driving test. In South Australia, this involves a series of thirty driving tasks over many weeks or months that are successively signed off by an accredited driving instructor once the driving competencies have been demonstrated to the required standard. This approach is based upon moving from manual and manoeuvring skills to demonstrating defensive driving principles, which involve scanning the road ahead for hazardous situations and taking appropriate action; therefore most driving instructors would be expected to follow the competency-based approach whether or not the learner is actually using that licensing method. In some jurisdictions, such as the NT and WA, competency-based assessments (by approved instructors or sometimes police) might also replace the practical test in remote areas where access to permanent or mobile licence testing services is not available. In several European countries successful completion of the practice test marks the commencement of the learner period after mandatory professional courses, while Canada, Ontario, British Columbia and Alberta mandate an on-road test to graduate to full licence. Traditionally, the test has focused on vehicle skills and manoeuvring in traffic and other practical skills such as reverse parking, with the testing instructor responsible for much of the decision making on issues such as route choice, lane change, turns, and so on.

Two UK studies have found strong associations between driving test errors or failures and crash risk (Baughan & Sexton 2002; Sexton & Grayson 2010). The early study quantified their findings, such that making 12 or more driving errors in the driving test was associated with an increase in crash rates (Baughan & Sexton 2002). The more recent cohort study found that, after adjusting for age, experience and mileage, first-time passers of the on-road driving test had a lower crash liability during the first year of driving that those who took more than one test (Sexton & Grayson 2010).

Elsewhere in Europe findings have been mixed. In France, research found no association between overall test scores and subsequent crash rates, although females who passed both the knowledge and practical tests on their first attempts experienced lower crash rates than females requiring multiple attempts (Maag et al. 1999; Maag, Laberge-Nadeau, Desjardins, Morin & Messier 2001). Conversely, in Norway, the better that male drivers performed in an on-road practical test, the more often they were involved in crashes and traffic violations (Hatakka, Keskinen, Gregersen, Glad, Hernetkoski 2002).
Analysis of the traditional driving test in NSW found test performance was only predictive of crash involvement among those who failed the test four or more times (Boufous, Senserrick, Stevenson & Ivers 2011). The test has since changed, however, as well as in Victoria and Queensland, and is intended to be more challenging and therefore requiring the 100-120 hours of supervised driving mandated in those jurisdictions in order to pass. The new driving test has an increased focus on safe behaviour and hazard perception, and more decision making is transferred to the novice driver, such as when to change lanes in order to turn a corner ahead, for example (Catchpole, Cavallo, Christie, Harrison, Johnston, Macdonald, Oh & Triggs 2008; McDougall 2009; Roads & Traffic Authority of NSW 2009). Victoria (Cavallo & Oh 2008) and NSW (Roads & Traffic Authority of NSW 2009) have subsequently reported that applicants requiring 120 hours experience have had better performance and pass rates on the new driving test than those reporting fewer hours (VIC) or under a 50 hour requirement only (NSW).

5.6.3 Hazard Perception Test

Hazard perception tests as part of driver licensing do not exist in the United States – or in New Zealand, although there hazard skills are tested during the driving test. Victoria and Western Australia include the test to transfer to a P1 licence, while in NSW, QLD and South Australia it is required for the P2 licence.

In Great Britain an electronic theory test that accompanies the on-road driving tests for provisional licensure was modified in 2002 to include hazard perception test items (Wells et al. 2008). A cohort study following new drivers over three years found this had resulted in at least a 3% decrease in the crash rate during the first year (Wells et al. 2008).

Victoria was the first to introduce a hazard perception test in 1996. Early research found low scores were associated with a higher risk of fatal crash, however with only a small effect and low reliability (Congdon 1999). A psychometric assessment was undertaken and the test was revised in 2002.

New South Wales introduced a hazard perception test in 2001. Later analysis by the Roads and Traffic Authority of NSW (2008) found that drivers who passed on their first attempt had fewer crashes. After controlling for age, gender and education/occupation, those who failed on the first attempt were 10% more likely to have an at-fault crash (as opposed to any crash, at-fault and not at-fault). Specifically, those failing at their first attempt were 37% more likely to have a fatigue-related at-fault crash, 23% more likely to have an at-fault crash involving a vehicle from an adjacent direction, 17% more likely to have an at-fault injury crash, and 16% more likely to have an at-fault crash at an intersection or a junction. A large cohort study has subsequently found that provisional drivers who failed the test at least twice were more likely to be involved in a crash (not controlling for at-fault status) compared to those who passed the test on the first attempt (Boufous et al. 2011). Few psychometric issues were identified. Psychometric properties and other considerations are discussed further in Wetton, Hill and Horswill (2011) in developing Queensland’s test.

5.6.4 Exit Tests

New Zealand and three Canadian provinces (Ontario, British Columbia and Alberta) all have advanced practical driving tests as exit tests to progress from the provisional stage to full licence stage, which include requirements for drivers to verbalise hazards and how they are managing them to the tester (Haire, Williams, Preusser & Solomon 2011). There has been no known evaluation of the effectiveness of these exit tests in terms of subsequent crash involvement. Exit tests do not exist in the United States. Alternatively, New South Wales has a computerised exit test, which combines an advanced safe driving knowledge test with an advanced hazard perception test (Roads and Traffic Authority of NSW 2008). It can be argued having such tests highlights that provisional drivers are still undergoing learning during this phase and need to demonstrate further skill advancement before progressing to a full licence. The exit tests are designed to be more demanding than those in earlier licence stages and this is somewhat reflected by failure rates of about 30% in New Zealand (Haire et al. 2011).

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6 From 28 July 2014, the hazard perception test in South Australia will become a requirement to graduate from a learner permit to a P1 licence.
The NSW exit test was introduced in July 2003 and subsequent evaluation demonstrated that P2 drivers who passed the test on their first attempt had fewer crashes, with overall performance on the test a significant predictor of subsequent involvement in most types of crashes (Roads and Traffic Authority of NSW 2008). After controlling for age, gender, education/occupation and licence tenure, those who failed on the first attempt were 16% more likely to have a crash in the following year. Those who scored 100% on the test had the lowest subsequent crash involvement. Those who failed at their first attempt the knowledge test component were nearly four times more likely to crash (19%) than those who failed the hazard perception component (5%). The evaluation also showed that an offence-free driving record for the P2 period (two years) was a stronger predictor of subsequent crash involvement; however, both better test performance and an offence-free record was the strongest combined predictor.

5.6.5 Conclusions: Licence Tests

Licence tests are important in encouraging education and training and set a baseline of knowledge and skills required to progress through GDL. There is currently no study that provides an example of the potential reduction in crash rates of introducing licence tests; only studies by test success or test scores.

Evaluations of theory/knowledge tests to transfer from learner to provisional stages are inconsistent in relation to crash risk. Findings for on-road practical driving tests at this transition have also been inconsistent although one evaluation suggests this might be due to gender differences, such that a failure on the first attempt for females and a pass on the first attempt for males were both associated with increased crash risk. The current practical tests in Australia have not been evaluated, or evaluated independent of other GDL initiatives, in terms of crashes.

The strongest and quantified findings are for hazard perception tests with one evaluation finding introduction of the test at the learner to provisional stages to reduce crashes by 3%. At the transition from P1 to P2, evaluation suggests those passing on the first attempt are 10% less likely to have at-fault crashes, including at-fault injury crashes, which were 17% less likely.

Only one evaluation of an exit test was identified, which combined a knowledge and hazard perception test. The evaluation was good quality and suggested those who pass on the first attempt are 16% less likely to crash. Subtest analyses suggest those passing the knowledge subtest on the first attempt are 19% less likely to crash and those passing the hazard perception subtest are 5% less likely to crash.

5.7 Minimum Provisional Licensing Age

Research around the world indicates that higher provisional licensing ages are associated with crash reductions (Williams 2009). For example, New Jersey’s licensing age of 17, unique in the United States, has safety advantages compared with neighbouring states that licence earlier (Williams 2010) as does Victoria’s licensing age of 18 compared with Australian jurisdictions licensing earlier (Drummond 1986).

The McCartt, Masten, and Trempel studies all found support for safety benefits of higher licensing ages. Age 17 in the McCartt study was associated with a 13% reduction in fatal crash rates for 15-17-year-olds compared to minimum age 16 and a 9% equivalent reduction in collision claims in the Trempel study. Age 16½-17 in the Masten study was associated with 23% fewer fatal crashes for 16-year-olds. These are studies conducted in the United States, where the licensing range is 15-17, with New Jersey the lone representative at 17. Separate studies in New Jersey, compared with neighbouring states licensing at 16, have also found evidence for net benefits of the higher licensing age, taking into account any offset due to the lesser driving experience of New Jersey 17-year-olds (Williams et al. 2010).

Further support is shown in the converse example in pre-GDL Canada, when the licensing age was reduced from 18 to 16 and was associated with a 12% increase in crashes, including 24% increase in fatalities for new drivers (Gaudry 1987 cited in Gregersen & Bjurulf 1996). Similarly, early research in 1986 explored the potential impact of reducing the provisional licensing age in Victoria to 17 or 16 to be in line with other states (Drummond 1986). At that time when road trauma was significantly higher than currently, it was determined that such a change would result in an additional 30-50 fatal crashes and 650-700 injury crashes if reduced to age 17 or 80-100 fatal crashes and 1,275-1,325 injury crashes if reduced to age 16.
Recent modelling research for South Australia also proposed that if the minimum provisional age was raised from 17 to 18, a 5-6% reduction in all serious road injuries and fatalities (60-70 in number) would be achieved; that is, an absolute reduction in South Australia’s road toll (Department for Transport, Energy and Infrastructure 2011). This represented a 20% reduction for drivers aged 16-24.

Independent of GDL, a longitudinal cohort study of learner drivers in the United Kingdom found that crash risk for those who gained their independent licence at age 18 was 9% lower than those who were licensed at the (minimum) age 17 (Forsyth, Maycock & Sexton 1995); albeit this does not account for unknown differences contributing to the delayed licence age, such as differences in individual characteristics or longer time on the learner licence (Masten et al. 2011).

The GDL literature therefore provides clear support for a minimum provisional age of 17 over 16 years. Brain development research also identifies age 16 as the typical onset of changes increasing impulsivity, distractibility and therefore does not support commencing independent driving at this age (Johnson & Jones 2011). There is also evaluation supporting age 18 over 16 and modelling research to support age 18 over 17, although not yet evaluations of actual crash outcomes due to changes in GDL models. Nonetheless the latter would be expected to reduce crashes and 18 years is the typical minimum age in Europe and Asia, as well as applying in Victoria for many years.

The minimum provisional age set does however have implications beyond crash involvement that also need to be considered, including potential impacts on employment opportunities. Technically, the legal driving age in the United States is 18 years with parental permission given to drive at younger ages; therefore underlying the introduction of tougher restrictions (particularly night and passenger restrictions) for under 18s (Mayhew, Fields & Simpson 2000). In contrast, New Zealand first set the minimum independent driving age at 15 in 1925 to coincide with the legal age at that time to leave school and potentially transition to employment (Williams 2009). Setting the minimum provisional licensing age therefore needs to be considered in the context of purposeful driving needs (such as employment), not just recreational and preferred transport by youth, and therefore with implications beyond road trauma only. Individual jurisdictions should review their own employment implications and identify if this could potentially be an issue in their jurisdiction before deciding if this needs to be considered as part of a GDL system.

5.7.1 Conclusions: Minimum Provisional Age

The literature demonstrates that higher minimum provisional age is associated with reduced crashes and fatalities. It can be concluded that age 17 will yield greater benefits than age 16, and that age 18 will be better than age 17. Examples of expected benefits within GDL evaluations include:

- for a minimum provisional age of 16½ or 17 rather than 16 years, 23% fewer fatal crashes for 16-year-olds;
- for a minimum provisional age of 17 rather than 16 years, a 13% reduction in fatal crash rates for 15-17-year-olds and a 9% reduction in collision claims;
- for a minimum provisional age of 18 rather than 17, a 20% reduction in crashes involving 16-24-year-olds; and
- for a minimum provisional age of 18 rather than 16, a 12% reduction in crashes and 24% reduction in fatalities among provisional drivers.

5.8 Provisional Holding Period and Minimum Exit Age

In the United States, provisional holding periods range from six months to two years, and graduation ages are generally 16½ to 18. Exit ages are constrained by the fact that, except in one state, GDL requirements expire at age 18. It is logical that longer periods in the system under restrictions, and older exit ages, would be beneficial from a safety standpoint, although the Masten study found no evidence confirming this. In Canada, minimum durations vary from 12 to 24 months and exit ages from 17½ to 18½. All novices in Canada are subject to GDL rules (regardless of age), unlike the United States. Research to explore the optimal provisional holding period and exit age has not been conducted.
Nonetheless, research in the US has found a positive interaction effect of age and BAC in relation to crash risk (Peck et al. 2008). The interaction between positive BACs and driver age under 21 was associated with a substantial significantly higher relative risk of a crash over and above that which might be expected from the additive risk of positive BAC and young age alone. New Zealand research has also found this interaction among driver fatalities at all BAC levels below 0.2% (Keall et al. 2004). Risks of fatality were significantly higher at all BAC levels for drivers aged under 20 years (over five times higher) and for drivers aged 20-29 (over three times higher) than for drivers aged 30+. This suggests that the zero or reduced BAC limit applicable to provisional drivers is important for novices through to their 20s.

While New Zealand and the Northern Territory have similar low minimum ages and holding periods to the United States, most Australian jurisdictions have an exit age of 20 years with several including 3-year provisional periods. Victoria, with a minimum provisional age of 18 (similar to most of Europe and Asia) has the longest known provisional period at 4 years and, accordingly, the oldest known minimum exit age at 22 years. While this positions Australia as providing the best opportunity to explore the impact of an extended provisional period, older exit age and crashes (e.g. comparison of Victorian novice driver records to those in other states), no such evaluation was identified.

Early research did however explore potential benefits of various durations of the provisional licence period in relation to the zero BAC limit in Victoria (Christie 1996). This research found that a 2-3 year provisional period was effective in terms of reduced alcohol-related crashes, and that, while three years might not confer a marked advantage over two years, one year was insufficient. A 3-year period in Victoria with minimum provisional age 18 therefore equated up to age 21.

On balance, BAC research, therefore, points to a 3-year provisional period as important, or at least until age 21, albeit the evaluations have mostly been independent of GDL requirements. Victorian statistics have demonstrated a decline in alcohol-related (≥0.05% BAC) road deaths for 18-20-year-olds from the 1980s to early 2000s in conjunction with a zero BAC and three-year provisional period (VicRoads 2005). At the same time 21-25-year-olds were found to have an increase in such deaths from the 1990s to early 2000s and in fact the highest rate of alcohol-involved fatalities of any age group (VicRoads 2005). This rate was 50% of all their fatalities compared to 21% of 18-20-year-olds and 23% for over age 25 years. This contributed to extending the provisional period to 4 years in Victoria. Together with the above New Zealand study, this suggests even longer provisional periods requiring zero BAC might be required to further reduce young novice fatalities.

5.8.1 Conclusions: Minimum Provisional Period

No evaluation to determine the optimal tenure for the provisional licence was identified and therefore no quantifiable benefits have been identified. However, BAC-related research suggests even small amounts of alcohol exacerbate the involvement of young novices in crashes and fatalities particularly until age 21 but also throughout their 20s. Therefore, the minimum holding period should be considered relative to the minimum provisional age, such that it is preferable for the tenure to extend to a minimum age of 21, if not longer, in relation to a zero BAC requirement.

5.9 Night Driving Restrictions

There is a long history of night driving restrictions in the United States where they existed originally independent of GDL in several states since the 1960s or 1970s. The origins of the early restrictions are unknown but presumably they were in response to the extra risk associated with night-time driving. The risk for fatal crashes is about twice as high at night as during daytime hours (Williams 2003). Recent US research also shows that both night-time and passenger restrictions indirectly target alcohol-related crashes, with 88% of all alcohol-involved fatal crashes of 16- and 17-year-old drivers occurring at night, with passengers present, or both (Williams, West & Shults 2012).
The effects of night-time driving restrictions were established long before the graduated licensing movement in North America. For example, in one four-state study in the United States, estimated crash reductions were 25% in Louisiana, 40% in Maryland, 62% in New York, and 69% in Pennsylvania (Preusser, Williams, Zador & Blomberg 1984). Overall reductions also were found in fatal crash involvements in states with and without night driving restrictions (Levy 1988). In New Zealand, when introduced as part of GDL, there was a 32% decline in crashes among 15-19-year-olds during restricted hours, and night-time crashes decreased from 25% of crash involvements before to 17% after the night restriction was adopted (Frith & Perkins 1992).

Once night restrictions began to be adopted on a wider basis, more evidence of their positive effects became available. Table 2 indicates the effect of night driving restrictions in jurisdictions that have reported effects during both restricted and unrestricted time periods (from Williams 2007). These data show much greater reductions during the restricted hours. A study in California also found strong positive effects associated with a night driving restriction, an estimated savings of 55 fatal/injury crashes per year (Masten & Hagge 2004). In a second California study, overall reductions of 17-28% were found in two separate post-law years in crashes involving severe or fatal injury of 16-17-year-olds, with the largest reductions (35-36%) during the restricted hours midnight-5 am (Rice, Peek-Asa & Kraus 2004). In New Jersey, the one state licensing at age 17, night driving restrictions (also midnight-5 am) were found to substantially reduce both fatal and non-fatal crashes during the restricted hours, more so than daytime crashes, for both 17- and 18-year-olds (Williams et al. 2010). At age 17, night-time fatal crashes were reduced by 44% and daytime fatal crashes by 21%; for all crashes night involvements were down 40%, daytime 15%.

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Restricted hours</th>
<th>Night</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida</td>
<td>11-6</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Michigan</td>
<td>12-5</td>
<td>59</td>
<td>32</td>
</tr>
<tr>
<td>North Carolina</td>
<td>9-5</td>
<td>47</td>
<td>22</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>12-5</td>
<td>49</td>
<td>5</td>
</tr>
</tbody>
</table>

*Data are for 16-year-olds in Florida, Michigan, and North Carolina; for 16-17-year-olds in Nova Scotia

There also have been multiple-jurisdiction studies of night driving restrictions. In a US national panel study the estimated reduction in fatal crashes among 16-17-year-olds was 10% (Fell, Todd & Voas 2011). The recent US national study by strength of GDL model found the reductions in injury crash rates of 16- and 17-year-olds in states with strong GDL models (including night and passenger restrictions – see footnotes on pages 12-13) were even greater at night than overall (Lyon et al. 2012).

The effectiveness of night driving restrictions is well established. There is, however, a question about what hours of the day they should encompass, particularly on the front end. The majority of restrictions in North America begin at midnight or later, but crash risk is also elevated earlier in the evening, and more night-time crashes occur between the hours of 9 pm and midnight than between midnight and 6 am.

The question of optimal starting time has been more systematically addressed in the McCartt, Trempel, and Masten studies. The McCartt study found much lower fatal crash rates for 15-17-year-olds under laws with night-time restrictions. Those beginning at 9 pm cut the rates an estimated 18% compared with having no restrictions, whereas those beginning at midnight had a 12% reduction. In the Trempel study, a 9 pm restriction reduced collision claims by 12% for 16-year-olds, and a midnight start did so by 8%. In the Masten study night restrictions beginning at 10 pm or earlier were associated with 19% lower crash incidence for 16-year-olds.

The ending hour for night driving restrictions ranges from 4 am to 6 am. No studies have addressed the relative effectiveness of different end points.
North American night driving restrictions also typically exempt from coverage activities deemed essential by jurisdictions; usually related to work, school activities in some cases, and a variety of other activities, such as medical emergencies. Information on trip purpose is not available in crash data files, so the crash risk associated with these activities and the extent to which exemptions limit the effectiveness of night restrictions are not known.

Notably also, the length of time that night restrictions apply for novices can vary from six months up to two years in the United States and national comparative studies have not focused on evaluations of differences based on this (although point rating systems attribute more points to models that have a minimum of 12 months or more). In the European Union, based on Project GADGET (Siegrist, 1999), a long-term project examining road safety initiatives in Europe, an early recommendation was that restrictions, such as night driving restrictions, should apply to all young drivers during their first year of unsupervised driving.

In Australia, Western Australia is the only jurisdiction with a night restriction, which was introduced in July 2008 and extends from 12 am to 5 am and applies for 6 months, with similar exemptions for purposeful versus recreational driving trips. This was introduced with other changes and preliminary analyses have shown a reduction in provisional driver crashes during the 9 pm to 5 am period (even earlier than the restriction from 12 am). Further an interaction with passenger carriage (not restricted) and the night driving restriction was found. From July 2009 (a 12-month lag), crashes in which the provisional driver and a passenger were injured during 12 am to 5 am had dropped from 9-12 per month to 1-2 per month.

While no other Australian jurisdiction includes night restrictions it is noteworthy that Australian provisional drivers similarly experience high crash risk at night. In an early NSW study, of all provisional drivers aged under 26 in fatal crashes, 33% crashed between 10 pm and 5 am compared to 14% of drivers aged over 25 (Roads and Traffic Authority of NSW 2004). Similar figures are found in South Australia: 35% versus 16% (Department for Transport, Energy and Infrastructure 2011). In Victoria, the risk of a crash during 10 pm to 6am is more than twice as likely than at other hours, and the equivalent risk of a fatal crash is about six times as likely (VicRoads 2005).

The Northern Territory provides one example of crash analyses to determine the potential reduction in police-reported crashes of night driving restrictions operating at different start and end times (Senserrick et al. 2009b). Analysis of 1999-2007 data showed drivers aged 16-19 (5.8% of licensed drivers) represented 21.8% of all drivers in crashes between 10 pm and 6 am, and 21.3% of those between 12 am and 6 am. Further analysis of 1997-2007 data compared provisional and full licensed driver crashes during 11 am to 5 am, 12 am to 5 am, and 12 am to 6 pm. Provisional drivers had a higher proportion of their crashes at night in all comparisons, and demonstrated higher proportions during the 6-hour period between 11 pm to 5 am, particularly for fatalities, than the 6-hour period after midnight, which was not dissimilar to the 12 am to 5 am period.

5.9.1 Conclusions: Night Driving Restriction

The literature is consistent in demonstrating significant benefits of night driving restrictions, even for 6 months only, with earlier start times likely to yield greater benefits than later start times. The restrictions generally include exemptions for purposeful driving, such as employment and education. Quantified benefits include:

For 16-year-olds:
- 12 am to 5 am: 59% reduction in night crashes and 32% reduction in day crashes.
- 11 pm to 6 am: 16% reduction in night crashes and 9% reduction in day crashes.
- 9 pm to 5 am: 47% reduction in night crashes and 22% reduction in day crashes.

Footnotes:
7 From 28 July 2014, South Australia will be introducing a restriction on driving between midnight and 5am for P1 drivers under the age of 25 for the duration of their P1 licence.
8 This information was provided by the WA Office of Road Safety (2013) in review comments for the purposes of this report.
Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

For 16-17-year-olds:

- 12 am to 5 am: 49% reduction in night crashes and 5% reduction in day crashes; 35-36% reduction in severe or fatal injury during restricted hours and 17-28% reduction overall.
- All US variations: 10% reduction in fatal crashes.

For 17-year-olds:

- 12 am to 5 am: 40% reduction in night crashes and 25% reduction in day crashes; 44% reduction in night fatal crashes and 21% reduction in day fatal crashes.

Comparisons by start times include:

- Commencing at 10 pm or earlier: 19% reduction in crashes for 16-year-olds.
- Commencing at 9pm: 18% reduction in fatal crashes for drivers aged 15-17; and 12% reduction in collision claims of 16-year-olds.
- Commencing at 12 am: 12% reduction in fatal crashes for drivers aged 15-17; and 8% reduction in collision claims of 16-year-olds.

5.10 Passenger Restrictions

Transporting passengers is associated with increased crash risk for teenage drivers. The risks are highest for 16-17-year-old drivers but also elevated for 18-19-year-olds (Doherty, Andrey & MacGregor 1998; Williams & Ferguson 2002). Crash risk is highest when multiple passengers are present, but even with one passenger is 1.5-2 times as high as when driving alone (Chen, Baker, Braver & Li 2000; Doherty et al. 1998). Although crash risk is higher at night, there is evidence that passengers increase young driver crash risk both during the day and night (Chen et al. 2000). Passenger restrictions in North America apply during all times of the day.

Passenger restrictions have been found to reduce crashes so substantially that there is no discernible offset due to more teenagers driving alone (including when modelled at various levels of compliance; Chen et al. 2001), or a transfer to increased cycling or pedestrian injuries or deferring of crashes to when older and the restriction is lifted (Chaudhary, Williams & Nissen 2007).

All of these studies were based on crashes during all times of the day; none has looked separately at crashes during daytime and night-time hours. New Zealand reported positive effects of their passenger restriction (which also applies all day) (Begg, Stephenson, Alsop & Langley 2001). Two studies of California’s passenger restriction found positive effects (Cooper, Atkins & Gillen 2005; Masten & Hagge 2004). In the Cooper study, the average number of teenage passengers carried by 16-year-old drivers in crashes decreased by 25%, resulting in the savings of an estimated eight lives and preventing 684 injuries over a 3-year period. Masten and Hagge estimated an annual savings of 816 fatal/injury crashes associated with implementation of the passenger restriction. A study of passenger restrictions in California, Massachusetts, and Virginia found crash reductions among 16-year-old drivers in each state, and reductions in motor vehicle-related injuries among 15-17-year-olds as drivers, pedestrians, or bicyclists. There were an estimated 740 fewer crashes per year in California, 173 per year in Massachusetts, and 454 per year in Virginia (Chaudhary et al. 2007).

National studies in the US have also reported positive effects of passenger restrictions. The national panel study by Fell et al. (2011) found an overall reduction of 9% in fatal crash involvement of 16-17-year-old drivers associated with passenger restrictions. The Baker et al. (2006) study reported a 21% reduction in fatal crashes among 16-year-old drivers. The recent analysis of 16- and 17-year-old injury crash rates in GDL states with strong GDL models (see footnotes on pages 12-13) found multiple passenger crashes were the most significantly impacted, with rates at 10-20% lower than the rates for injury crashes overall (Lyon et al. 2012).
As in the case of night restrictions, the issue of which specific type of passenger restriction is most effective has come under discussion. The debate has centred on whether zero or one passenger should be allowed. Those arguing for one passenger, even though that entails substantially increased crash risk, assume that there will be greater compliance than if no passengers were allowed. This debate is not yet settled as the Masten, Trempel, and McCartt studies have different findings. The Masten study found strong evidence for maximum safety benefits from GDLs allowing no more than one passenger for six months or more. Under this scenario, reductions in fatal crash incidence were 20% for 16-year-olds and 12% for 17-year-olds. The reduction for zero passenger limits was much lower (9% for age 16). The Trempel study reported a 6% reduction in collision claims for 16-year-olds for restrictions allowing one or fewer passengers. The McCartt study found a 21% reduction in the fatal crash rate of 15-17-year-olds when beginners were prohibited from driving with any passengers in their vehicles, whereas allowing one passenger reduced the rate by 7%.

There is one dimension of passenger restrictions that has not been considered in research. The restrictions differ in who is covered, some prohibiting passengers of all ages, others prohibiting only those of a certain age, most often those under age 21, but in some cases, 17, 18, 19, 20, or 25. The greatest crash risk is found when teenage drivers are carrying passengers of about their own age, although increased risk has been reported when the passengers of teen drivers were in their 20s (Chen et al. 2000; Ouimet, Simons-Morton, Zador, Lerner, Freedman, Duncan & Wang 2010). The relative effectiveness of these differences in coverage could be addressed but has not been.

One other issue involving passenger restrictions is that in most GDL models siblings are exempted from the rule. Crash data files do not include the relationship among occupants in crashes, so it is not easily possible to determine if this makes sense from a risk standpoint. The one relevant study relating to this issue explored injury risk in crashes (insurance data) and found that younger siblings of teen drivers had a 40% lower chance of injury in the crashes than non-siblings; although their injury risk was still much higher than when traveling with adults (Senserrick et al. 2007).

Victoria is the only Australian jurisdiction9 with passenger restrictions that operate at all times: only one passenger aged 16-21 years for 12 months. This was justified by research that showed 18% of P1 driver passenger crashes occurred during the day compared to 8% at night. The fatal crash risk of P1 drivers with multiple passengers was over 0.08 per million kilometres travelled compared to 0.02 for either none or one passenger only.

In both NSW and QLD there is a passenger restriction at night for drivers aged under 25: only one passenger aged under 21 between 11 pm to 5 am. The only known evaluations of their effectiveness are the 40% reduction in provisional driver fatal crashes in NSW (Audit Office of New South Wales 2011) and 30% reduction in P1 driver crashes in Queensland (Newstead & Scully 2013) since their GDL reforms including this passenger restriction were introduced; however, in both cases other reforms were simultaneously introduced and therefore the relative contributions of the passenger restrictions to the reported reductions are unknown.

Evaluations in Australia are often limited by a lack of reliable data on passenger age in crash databases and therefore compare impacts for none, one and two or more passengers irrespective of age. A higher involvement in fatal crashes for provisional drivers with multiple passengers (of all ages) compared to older, fully licensed drivers has also been demonstrated in NSW (36% vs 15%; Roads and Traffic Authority of NSW 2004), the Northern Territory (20% vs 16%; Senserrick et al. 2009b) and South Australia (28% vs. 13%; Department for Transport, Energy and Infrastructure 2011).

The recent interim evaluation of Victoria's GDL, which includes a restriction to one peer passenger, has also shown positive results (Healy et al. 2012). Significant reductions were found in all casualty crash involvements (57%) and fatal and serious injury crash involvements (58%) of post-restriction P1 drivers carrying two or more peer passengers. The evaluation was also able to show that this was not offset by an increase in crashes with none or one passenger, as these crashes also reduced.

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9 From 28 July 2014, South Australia will be introducing a passenger restriction for P1 drivers under the age of 25, allowing no more than one passenger aged 16-20 years for the duration of their P1 licence, excluding immediate family members.
Overall therefore, similar to night driving restriction evaluation, most of the research on peer passenger restrictions originates in the United States where restricted periods range from a minimum of 6 months, whereas the P1 period is commonly 12 months in Australia or longer in New Zealand. Passenger age limits range from under 17 to 21 to be at least two years older than the provisional driver minimum age, with none or one such passenger a common restriction. No clear evaluation comparing the relative risks of one or no passengers of peer age or of all ages was identified. Australasian jurisdictions should conduct internal analyses to determine the optimal restriction as data on passenger age improve, particularly based on serious injury and fatal crashes, including passengers and other road users involved in the young driver crash. Exemptions for immediate family members could be available albeit injury risk is likely still heightened (albeit not as high) for peer-aged siblings travelling together.

5.10.1 Conclusions: Peer Passenger Restriction

There is consistent evidence that peer passenger restrictions are effective, albeit optimal combinations of length of tenure, and age range of passengers permitted is yet to be clearly investigated. Exemptions often apply for immediate family members, which research suggests can attenuate risk but not to the same extent as when an adult is driving.

Quantified examples of the benefits of peer passenger restrictions of varying duration and passenger age limits, with a restriction to one peer passenger only include:

- 20% reduction in fatal crash involvement and 6% reduction in collision claims of 16-year-olds
- 12% reduction in fatal crash involvement of 17-year-olds
- 7% reduction in fatal crashes of drivers aged 15-17 years.

Quantified examples of the benefits of peer passenger restrictions of varying duration and passenger age limits, with a restriction to no peer passengers include:

- 20% reduction in fatal and injury crashes of 16-year-old drivers and a 21% reduction in fatalities and injuries of their peer passengers
- 25% reduction in the involvement of peer passengers in crashes of 16-year-old drivers
- 21% reduction in fatal crashes of drivers aged 15-17 years.

5.11 Blood/Breath Alcohol Concentration Restrictions

When New Zealand introduced GDL in 1987, a 0.03 mg% law was included. An attempt was made to isolate the separate effects of this policy, but the results were not definitive (Begg & Stephenson 2003). In North America, BAC limits of zero or near zero were enacted prior to the establishment of GDL. Studies have indicated that zero BAC limits reduce alcohol-involved crashes among 15-19-year-olds. In a systematic review of the literature, six studies that met established scientific criteria for design and execution were identified (Shults, Elder, Sleet, Nichols, Alao, Carande-Kulis, Zaza, Sosin, Thompson & Task Force on Community Preventive Services 2001). Three studies that examined fatal crash outcomes reported declines of 24%, 17%, and 9%. Two studies based on fatal and non-fatal injury crashes found declines of 17% and 4%. A study based on police-reported alcohol consumption reported a decline of 11%.

The difference between a zero and minor BAC limit, such as 0.02%, is a clear separation of alcohol consumption and driving rather than allowing attempts to manage alcohol consumption, for which counting drinks and other strategies are often inaccurate among young drivers (Senserrick 2003). An early examination of six studies from Australia and the United States among drivers aged 15-21 found jurisdictions with a zero BAC experienced an average 22% reduction in nighttime single vehicle fatalities compared to 17% for those with a 0.02% limit (and only 7% if between 0.04% to 0.06% BAC) (Zwerling & Jones 1999). New Zealand research has since estimated that young drivers’ fatal crash risk doubles for every 0.02% increment (Keall, Frith & Patterson 2001) and is inflated further at night and with each additional passenger (Keall et al. 2004).
There is also considerable research evidence demonstrating that even very low BACs impact negatively on driving, including vision, psychomotor skills, information processing, dividing attention, vigilance and drowsiness (Chamberlain & Solomon 2002). Further, this impact is greater on young, novice drivers than older, experienced drivers (Peck et al. 2008).

5.11.1 Conclusions: BAC Limit

Alcohol differentially impacts young novices even at low BACs level in comparison to older experienced drivers at the same BAC levels. There is clear evidence in GDL evaluations that a zero limit is more effective than even small limits such as 0.02%. Examples of quantified benefits of a zero BAC include:

- 9-24% reduction in alcohol-related fatal crashes of 15-19-year-olds
- 4-17% reduction in alcohol-related fatal and injury crashes of 15-19-year-olds
- 22% reduction in night-time single vehicle fatalities (compared to 17% with a 0.02% BAC limit and 7% with a 0.04-0.06% limit).

5.12 Mobile Phone or Other Technology Restrictions

5.12.1 Increased Crash Risk When Using Mobile Phones, Other Technology

Western Australian research on mobile phone use (McEvoy, Stevenson, McCartt, Woodward, Haworth & Palamara 2005) was among the earliest studies demonstrating an increased risk of crash injury when using a mobile phone, either hand-held or hands-free, or other technology when driving (see review, Kircher, Patten & Ahlström 2011). Recent naturalistic driving studies with all-aged drivers have not found statistically significant increases in crash risk during the talking phase specifically, but substantial increases (2-6 times increased risk) for the dialing phase (Klauer, Dingus, Neale, Sudweeks & Ramsey 2006; Olson, Hanowski, Hickman & Bocanegra 2009). However, any impact is likely to be heightened for novice drivers and particularly young novices in a developmental phase where distraction is particularly compounded (Johnson & Jones 2011). This likewise also would apply to other technology use while driving. While no specific GDL-restricted technology study evaluations were identified, naturalistic driving research has also clearly shown the detriment of long glances away from the road. Researchers were able to quantify the risk threshold, with glances of more than two seconds away from the road for any purpose increasing near-crash/crash risk by at least two times that of baseline driving (Klauer et al. 2006).

Several studies have demonstrated the increased risk of crash or injury due to phone use while driving specifically with young drivers and in particular when texting. Earlier Australian simulator research in Victoria found young people (aged 18-21) spent up to 400% more time with their eyes off the road when texting than when not texting (Hosking, Young & Regan 2006). Recent US research has confirmed this risk can result in increased crashes in recent simulated and hospital-based studies. Simulator research showed young drivers (aged 16-25 years – with no differences by younger and older age) performed more poorly when texting or talking on a phone, including more lane deviations and crashes, greater fluctuation in speed, significantly fewer lane changes, and longer durations to complete the driving scenario (Stavrinos, Jones, Garner, Griffith, Franklin, Ball, Welburn, Ball, Sisiopiku & Fine 2013). A US trauma unit survey of presenting patients found young (aged 25 or younger) patients who were heavy texters (sent 30+ texts per week) were 6.76 times more likely to be involved in a motor vehicle crash than adult non-heavy texters (Issar, Kadakia, Tsahakis, Yoneda, Sethi, Mir, Archer, Obremesky & Jahangir 2013).

Another recent study in Poland has demonstrated that even hearing the mobile phone ringing is sufficient to increase reaction times on a complex computer task among participants aged 19-22 years (Zajdel, Zajdel, Zwolińska, Śmigielski, Beling, Ceglirski & Nowak 2012). Further, a study in two US states where hand-held phone use is restricted found that increasing frequency of self-reported texting or accessing the web while driving by young people (aged 17-29 years) was associated with both an increasing number of self-reported traffic offences (any offences) and self-reported crashes (Cook & Jones 2011).
5.12.2 GDL Restrictions on Use of Mobile Phones, Other Technology

Compared to a plethora of research on the risk of phone and technology use while driving (which has particularly proliferated in the past few years), the inclusion of specific restrictions on such devices within GDL models is a more recent feature of GDL and has not yet been well evaluated. Laws prohibiting mobile phone calls and texting within GDL models have become popular in North America, with a recent report by the Centre for Disease Control reporting that by February 2013 a total of 33 US states and DC now have laws restricting at least some teens or new drivers from use of electronic devices while driving (Naumann & Dellinger 2013). The only observational studies of the effect of mobile phone restrictions have however produced disappointing results.

Two key studies are derived from a US state, North Carolina, in which a restriction on use of any mobile communication device by drivers younger than 18 years was introduced in December 2006. Evaluation found essentially no change in use (11% to 12%) five months after the law took effect (Foss, Goodwin, McCartt & Hellinga 2009). It was acknowledged by the authors however that there had been minimal enforcement of the restriction, which research has shown is often a key factor in achieving compliance (Berg 2006; Goodwin, Wells, Foss & Williams 2006; Jones 1994a). In a later review two years after the restriction, teen mobile phone use while driving had decreased in North Carolina, but by about the same amount as in South Carolina, where it was legal, leading the authors to conclude that there was no long term effect of the GDL restriction (Goodwin, O’Brien & Foss 2012).

It could be argued that a higher level of enforcement could be presumed likely in Australian states than in North Carolina given restrictions on hand-held phones apply to all drivers and have long been part of routine enforcement; and also given Australia generally has a stronger enforcement culture than in the United States – particularly relative to GDL restrictions, which are largely considered to be primarily enforced by parents in the US, not least due to the general lack of L and P-plate type identifiers (Foss & Goodwin 2003; see also evaluation of introduction of P driver identifiers in New Jersey estimating significant crash reductions: Curry, Pfeiffer, Localio & Durbin 2013; notably New Zealand also does not require P plates). Therefore it might be presumed that mobile phone restrictions would be more effective in Australia than in the US. Indeed, a restriction on all mobile phone use was among the most recent changes to GDL in NSW, which collectively have reduced fatal crashes for provisional drivers by 40% (Audit Office of New South Wales 2011); albeit, the relative contribution of the mobile phone restriction is unknown.

However, such an impact was not clearly evident in the recent interim evaluation of Victoria’s latest GDL changes (Healy et al. 2012), which included a restriction from all phone use for learner and P1 drivers (with hand-held use also restricted for all drivers in Victoria). Only 2% of learner drivers reported either hand-held or hands-free use following the restriction; however, comparable pre-restriction use was not able to be reported as the survey question had changed. Among provisional drivers, positively, self-reported hands-free phone use and hand-held phone use to talk was less common than prior to restriction; however, their self-reported texting was found to be more common. Also positively, both hands-free and hand-held phone use offences were reported as less common. However, none of these findings was statistically significantly different. With additional data available for the final evaluation report, the strength of these outcomes might be clearer. In the interim, another study provides further doubt on the impact of the restriction. A 2010 roadside observational study in the capital city (Melbourne, Victoria), found that young drivers (<30 years) were among those most likely to be observed using hand-held phones while driving, that hand-held use had increased since a previous survey in 2006, and that there was no significant difference in hand-held use among drivers displaying L, P1 or P2 plates than those without plates (Young, Rudin-Brown & Lenné 2010).

Therefore, it is not yet possible to conclude that additional mobile phone restrictions for learners and provisional drivers are effective in impacting on all phone use while driving, albeit some risky use might be reduced, and there is as yet no evaluation and therefore no evidence of an impact on crash involvement. It is therefore difficult to determine how effective restrictions on other technologies would be, and indeed difficult to determine the impact should young driver phone use increase further. Young drivers are likely to be the most aggressive users of technologies (Lee 2007). Research by the University of Maryland found young people described loss of connection to their phones and technology for one day using language relative to symptoms of withdrawal from dependent substance use (Moeller 2010). It is possible that the law and threat of enforcement alone could be inadequate for this GDL restriction to sufficiently influence young people and that other technological solutions (such as phone blockers or devices to manage distraction from multiple technologies; see e.g. Lee 2007) might be needed.
Nonetheless, a recent example of a highly successful enforcement campaign in reducing hand-held phone use among all-aged drivers derives from the US (National Highway Traffic Safety Administration 2012). The campaign was coordinated by the National Highway Traffic Safety Administration (NHTSA – US Department of Transportation) and conducted in demonstration sites in Connecticut and New York in two waves (3 months apart). A specific slogan (“Phone in One Hand, Ticket in the Other”) was developed for the campaign following focus group research and the target group was clearly defined (men and women aged 18 to 45 years). NHTSA coordinated the campaign and supplied sample templates that could be developed into localised pre- and post-wave press releases and factsheets. NHTSA also purchased media time for each wave while road administrations in demonstration sites had flexibility in adding their own media, which in one state included variable message boards and digital billboards displaying the slogan. States differentially conducted enforcement according to their preferred approaches and had flexibility to include overtime shifts and in some sites had officers dedicated solely to the campaign. NHTSA public awareness surveys indicated high awareness of the campaign and perceived increases in offence ticketing. NHTSA observational surveys pre and post the campaign found hand-held phone use decreased by 38-56% at the various demonstration sites and texting decreased by 42-68%.

Overall, there is clear research evidence of the negative impact of mobile phone use on driving performance for young novices, including aged through their 20s, and to some extent use of other technology, but not yet evidence that restricting use alone is effective in sufficiently changing behaviour or preventing crashes. Intensive, targeted on-going enforcement might increase effectiveness but other technological interventions might also be needed to impact on crash risk. It is noteworthy here that despite this, mobile phone use or at least texting restrictions are increasing in the United States, while passenger restrictions, for which there is clear evidence of crash benefits, are less likely to be adopted or strengthened despite passengers representing a significant distraction for young novice drivers as do phones and other technologies. The same could be argued to some extent for Australia.

### 5.12.3 Comment on Effectiveness of Mobile Phone Restrictions Generally

It is noteworthy here that the evidence for mobile phone restrictions generally is yet to be clearly established and therefore the above findings are not necessarily a reflection of limitations among young novice drivers only. In particular, analysis of insurance claims in four jurisdictions in the United States has found that hand-held restrictions had no effect on claim rates before and after restrictions were introduced (Highway Loss Data Institute 2009). A more recent analysis of long-term crash rates by counties five years after hand-held restrictions were introduced in the state of New York only found injury crash reductions in counties with high driver densities (Jacobson, King, Ryan & Robbins 2012). In fact the authors found increases in injury crashes in the long-term in counties with low driver densities. It is not clear why the potential impact of hand-held phone use on driving performance is not more clearly evident in crash and claims data.

### 5.12.4 Conclusions: Mobile Phone/Other Technology Restrictions

While there is clear evidence of increased crash risk for young drivers from mobile phone use, both hand-held and hands-free, and this evidence is emerging for other technologies, there is limited evaluation of restrictions from their use in GDL models in terms of crash implications; and therefore no quantifiable benefits were identified. The single evaluation found no effect of a mobile phone restriction but in a jurisdiction lacking police enforcement of the restriction. Research suggests accompanying targeted enforcement campaigns could improve compliance.
5.13 Vehicle Power Restrictions

Restrictions on high-powered vehicles do not exist in New Zealand or North America, whereas Victoria has long had restrictions for provisional drivers and other Australian jurisdictions have followed in recent years (NSW, QLD, SA). Early work in Victoria by Drummond suggested first-year drivers might be at greater risk of a casualty crash in a vehicle of more than 150 BHP than a similar driver in a vehicle of less than 150 BHP (Drummond & Healy 1986). Later, Drummond (1994) estimated the restriction would only provide a less than 2% crash reduction among the small number of young drivers who would normally drive these vehicles; provided their crash risk did not transfer with them to other vehicles. This latter condition is arguable. There have been considerable advances in vehicle performance and high-speed, aggressive manoeuvring is possible in much of the vehicle fleet that is not prohibited by such a restriction. This was also argued by the Australian Transport Safety Bureau (2004) in their report commemorating World Health Day. The report referred to a coronial review of all young driver fatalities in 1998-1999, which found that only 6 of 176 vehicles driven by the young drivers could be classified as “high performance”.

A later crash-based evaluation in Western Australia found no association between a high power-to-weight ratio vehicle and increased injury crash risk for young, novice drivers (Palamara & Gavin 2005). In addition, the authors cautioned that such a restriction might lead novices to drive less safe vehicles given that high-powered vehicles are among those with the highest occupant protection ratings. Discouraging use might also have unintended consequences when a young driver is unable to drive the family vehicle due to the restriction. This could possibly lead to an increase in young drivers having access to their own vehicle, which is likely to be an older and/or smaller vehicle with less occupant protection (Cammisa et al. 1999; Williams et al. 2006). Research has also demonstrated that young drivers with access to their own vehicle, as opposed to a shared family vehicle, are more likely to drive more, take more driving risks, and have a higher crash risk, even when adjusting analyses for how much driving they do (Chen, Palamara, Senserrick, Stevenson & Ivers 2012; Senserrick, Kinsman, Garcia-Espana, Hafner, Ginsburg & Winston 2007).

Most recently a 2013 published study based on both New Zealand and Australian data sought to estimate possible injury reductions if vehicle restrictions applied to all drivers under the age of 25 years and were complied with 100%, using the age of vehicle owners as a proxy for driver age (Keall & Newstead 2013a). A 69% increased adjusted injury risk for young driver owners of high performance vehicles was found compared to those in other vehicles, and a 101% increased risk of an injury occurring in those high performance vehicles compared to in other vehicles. However, prevalence of young-driver-owned high performance vehicles in the crash fleet ranged from as low as 1.0-4.0% in New Zealand to 4.7-5.1% in various Australian states. Therefore, the estimated injury savings were corresponding low: 0.4-1.8% in New Zealand and 2.2-2.5% in the Australian states. The study could not account for prevalence of young drivers of parent-owned high performance vehicles, or fully control for the risk of young drivers currently crashing in high performance vehicles having similar crash risk in lower performance vehicles due to similar driving errors or risk taking behaviour, for example. Based on this and likely less than 100% compliance, as well as the likelihood that costs of implementation and enforcement of vehicle restrictions would be considerable, the authors concluded there was likely limited net gain in cost-effectiveness terms in implementing such restrictions.

Costs aside, however, the study also did not consider the potential inflated injury risk noted above due to young drivers who might otherwise share a family high performance vehicle instead of driving their own vehicle with likely lower occupant protection (older vehicle) and greater exposure and risk taking (Cammisa et al. 1999; Senserrick et al. 2007; Williams et al. 2006). It is not possible to determine whether such a transition would negate the injury reduction benefits identified and therefore the evidence for this restriction remains unclear. Additional research by the same authors of the above study based on New Zealand crash records for drivers aged under 20 years found that only 14% of the crash-involved young drivers were owners of the crashed vehicle (Keall & Newstead 2013b). Based on their assumption that owners aged 30-59 were likely to be parents of the young drivers, 55% of the crashed vehicles were owned by parents and these were an average of two years younger and with higher crashworthiness than the vehicles owned by young drivers (albeit these were still less crashworthy that vehicles owned by drivers aged 60+).
5.13.1 Conclusions: Vehicle Power Restriction

Australasian evidence shows that drivers aged under 25 of high performance vehicles have higher crash injury risk. There have been no evaluations demonstrating benefits of vehicle power restrictions but modelling research, assuming 100% compliance, shows injuries can be reduced; however, due to low prevalence of use of these vehicles, anticipated reductions are minimal.

Examples of quantified benefits identified are:

- 0.4 to 1.8% reduction in injuries due to young driver (<25 years) crashes in New Zealand
- 2.2 to 2.5% reduction in injuries due to young driver (<25 years) crashes in Australia.

5.14 Specific Sanctions for Speed, Alcohol or Other Offences

Some specific sanctions for driving offences, particularly speeding and alcohol related offences, can be more stringent for novice drivers than fully licensed drivers. These can include hefty fines and longer suspension periods but also typically centre on demerit point systems in Australia, where either more points per offence apply (e.g. NSW’s ‘zero tolerance’ for speeding) or the overall demerit point threshold before suspension or loss of licence is lower. Such approaches are also applied in several countries in Europe (Twisk & Stacey 2007) and increasingly in the United States (e.g. Georgia Department of Driver Services 2013; State of Connecticut 2008). Additional measures include mandatory participation in driver improvement programs and also mandatory fitting of vehicle alcohol interlocks in the case of alcohol-related offences, such as in Victoria for all first-time provisional offenders or those aged under 26. South Australia also restricts driving at night (12am to 5am) for those returning from a suspension following a serious disqualification offence, defined as criminal driving offences e.g. causing death by dangerous driving; an offence that incurs four or more demerit points; a second speeding offence that incurs three or more demerit points; a red light offence and a speeding offence from the same incident; and any offence committed by a person previously disqualified from driving.10

5.14.1 Demerit Point Systems

Early research in Ontario, Canada found demerit points to be the most important predictors of future crash involvement (Chipman & Morgan 1975), with this finding later confirmed in Victoria, Australia, although both demerit points and prior casualty crash involvement were together the strongest predictor of future crash involvement (Diamantopoulou, Cameron, Dyte & Harrison 1997).

Later evaluation studies in Europe focused on initial impacts when demerit point systems were introduced. A review by Twisk and Stacey (2007) found positive impacts included a 5% crash reduction in the target group in Germany and 19% reduction in Austria, although Austria simultaneously introduced a reduced BAC limit. No such reduction was found in Great Britain in the first year and only a slight reduction in the second year. In Finland the impact was evidenced only in repeat offences rather than crashes. A more recent evaluation in Spain however credited the demerit point system introduced in 2006 as resulting in a 14.5% reduction in fatalities over 18 months (Pulido, Lardelli, de la Fuente, Flores, Vallejo & Regidor 2010).

Introduction of demerit point systems generally are therefore associated with crash reductions but no specific evaluation focusing only on reduced demerit point thresholds for young novice drivers was identified. A reduction however is in keeping with allowing novices to make some errors while first driving independently but not allowing serious offences.

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10 A night driving restriction will apply to all P1 drivers from 28 July 2014, and as such it will no longer be a sanction following a serious disqualification offence.
Another approach for novice drivers is to allocate additional demerit points for certain offences compared to experienced drivers. An example of this is NSW’s ‘zero tolerance’ on speeding, such that any P1 speed-related offence results in 4 demerit points (Audit Office of New South Wales 2011). This equals the reduced demerit threshold and therefore an automatic licence suspension for 3 months applies (or confiscation if 30 km/h or more over the speed limit, as applies to all drivers). This was introduced to address the significant over-representation of young drivers in speed-related fatalities; the single greatest contributing factor. While not separately evaluated, this component was included in the 2007 changes, which collectively have been associated with a 40% reduction in provisional driver fatal crashes (Audit Office of New South Wales 2011).

5.14.2 Maximum Speed Restrictions

Related to sanctions are the reduced speed limits required of learner and provisional drivers in some Australian states. These do not exist in New Zealand or North America, although Ontario, Canada prohibits learners from driving on expressways or high-speed highways. Boase and Tasca (1998) have reported that collisions on prohibited roads were reduced by 61%; however, Doherty and Andrey (1997) expressed concern that this policy might lead to driving on roads that have higher crash rates than expressways and suggested this was associated with a 5% increase in total crash involvement.

It has been reported that Victorian research has also shown that setting speed limits at 20 to 30 km/h below the posted speed limit could increase young driver crash risk, although any further details of this research, or a reference for a full report, were not included in this discussion paper (Queensland Transport 2005). There can be safety benefits of allowing all vehicles to travel at the same speeds to prevent, for example, aggressive driving and unsafe overtaking by drivers able to travel at higher speeds. This needs to be balanced against the reduced risk of injury should a crash occur when travelling at lower speeds. Earlier European Union reviews of novice driver initiatives advised against the introduction of differential speed limits for novice drivers but acknowledged a lack of evaluations regarding this GDL initiative (Bartl 2000, 2001). The current review failed to detect details of any evaluations on maximum speed restrictions.

As summarised in Table 1, several states in Australia include reduced maximum speed thresholds for learner, P1 and/or P2 drivers. NSW recently raised this threshold for learner drivers from 80 km/h to 90 km/h in keeping with their P1 limit, following a recommendation from the state Auditor General to facilitate the transition from learner to P1 (Audit Office of New South Wales 2011).

5.14.3 Alcohol Interlocks

Alcohol interlocks have been in use since introduced in California in 1986 and are now included in sanctions for drink-driving offences in the United States, Canada, Australia and Sweden (Lahausse & Fildes 2009). No evaluation of alcohol interlock sanctions specifically for young novice offenders was identified or provided.

A recent systematic review found large reductions in repeat offences when interlocks were fitted to the vehicle, but that offence rates reverted to similar levels to comparison groups once removed (Elder, Voas, Beirness, Shults, Sleet, Nichols & Compton 2011). While only three studies reported on crash outcomes, these also showed decreases in crashes when the devices were fitted.
In Australasia, New Zealand and several Australia states can require alcohol interlocks to be fitted once returning to driving following a drink-driving-related suspension. Sweden’s alcohol interlock program alternatively allows offenders to opt to continue driving with an interlock in lieu of a suspension but they must also undergo regular medical assessments at their own expense to provide evidence that they do not have an alcohol disorder or are able to manage the disorder for two years (Bjerre 2003). Initial evaluation when the program was first on trial in three counties, found 12% of offenders selected the interlock option, of which 60% were diagnosed as alcohol dependent or alcohol abusers (Bjerre 2003). A high rate of compliance, reduction in alcohol consumption and zero recidivism was identified. Moreover, while in the program the rate of police-recorded crashes reduced from 22 per 1,000 to 4 per 1,000, the same rate as the average driver, the evaluation did not extend beyond when interlocks were fitted. Later evaluations that did include post-program evaluation focused on health care. Significantly fewer program participants required hospital care or applied for sick leave compared to before participation as well as relative to others who were eligible and intended to participate in the program but had not had access (Bjerre, Marques, Selén & Thorsson 2007). These findings only persisted after the program for those who completed the full two years. A complementary study found average total health care costs for participants were 25% lower during the program and even more pronounced (37%) among those who completed the full two years, including a 20% reduction following the program (two-year follow-up) (Bjerre, Kostella & Selén 2007).

Australian research has alternatively argued that interlocks should apply across the vehicle fleet to increase acceptance and compliance before an offence need be detected, and also reduce the stigma associated with their use among current target groups of offenders and fleet vehicle drivers (Lahausse & Fildes 2009). The research calculated benefit-cost ratios if all newly registered vehicles in Australia were fitted with the devices. It was estimated reductions of up to 24% of all fatalities and 11% of all serious injuries could be saved each year at lower benefit-cost ratios than targeting only high-risk offenders.

5.14.4 Driver Improvement Programs

A 2000 review, Project DAN1, assessed all post-licence driver improvement programs in EU countries (Bartl 2000). The review found that driver improvement courses were important in reducing recidivism rates but needed to be targeted to the offence and offender group and be delivered by trained medical professionals for certain offences. For example, in Austria, driver improvement courses for drink-drivers conducted by psychologists were associated with a 50% reduction in drink-driving recidivism.

Later, however, a 2003 meta-analysis review of post-licence education programs assessed 20 trials of driver improvement programs for licensed drivers who had committed traffic offences (Ker et al. 2003). No significant reductions in (all) crashes, or injury crashes were found for such programs, although a small but significant 4% reduction in subsequent traffic offences was detected relative to controls. These programs have not traditionally separated novices from experienced offenders, however.

Several studies of a National Driver Improvement Scheme in the United Kingdom also failed to show an association with crashes, although reductions in self-reported driving violations as measured by the Driver Behaviour Questionnaire were evident (see Conner & Lai 2005). This program also was not specifically focused on novice drivers and their offences.

The most promising recent findings are emerging from a more recent optional (in lieu of paying a fine), online diversionary program for drivers aged under 25 introduced in the United Kingdom (af Wahlberg 2010, 2011). The “e-learning” program for “non-serious” offences was associated with attenuated levels of aggression, stress, sensation seeking, drink driving and driving violations at six months after the course (af Wahlberg 2010). Additional research also showed a significant reduction in the number of repeat offences and demerit points, and some indication of reduced crashes, such that participants showed a 38.5% reduction in crashes compared to 29% reduction among controls, or approximately 10% lower (af Wahlberg 2011).
5.14.5 Good Behaviour Requirements and Regression to Previous Licence Stage

In North America, GDL evolved from probationary systems, in which full licences were available after the learner stage. However, the licence could be revoked or suspended, or some driver improvement action could be required, at a lower threshold than for adult drivers. Those penalty structures have largely been maintained under GDL, and in many cases there is a ‘contingent advancement’ feature, in which a crash and violation free record is required in order to advance to the next stage of GDL and to graduate. Research on GDL penalty structures has been scant and inconclusive. One key issue, however, is the extent to which young drivers, their parents, and police know of these laws and the extent to which they are applied. In the compendium Countermeasures that Work; A Highway Safety Countermeasure Guide for Highway Safety Offices (2011), their effect is classified as “uncertain.”

A good behaviour requirement has been explored in one US jurisdiction, Maryland (see ‘contingent advancement’ in McKnight & Peck 2003). At the time of an 1983 evaluation, a 6-months violation free period was required to progress to full licensure (for provisional drivers minimum age 16 years). This was associated with a 10% reduction in offences for 16-year-olds (and non-significant reduction of 5% among 17-year-olds). Maryland subsequently increased the violation-free period to 12 months.

As noted above in relation to exit tests, NSW evaluation has found a two-year offence-free period was a better predictor of crash reductions than the exit test, albeit both better test performance and an offence-free record was the strongest predictor (Roads and Traffic Authority of NSW 2008).

Since 2006, South Australia’s GDL has included a provision that learner and provisional drivers must regress to the previous stage when returning to driving following a disqualification. In 2010, a provision was introduced that allowed disqualified provisional drivers to be offered a Safer Driver Agreement (Department for Transport, Energy and Infrastructure 2011). The Agreement, currently not available for serious offences, allows continued driving under strict conditions, which if breached results in doubling the original disqualification period. As such this is an extension of the ‘good behaviour’ requirement. No evaluation research on this initiative was identified or provided.

5.14.6 Conclusions: Specific Sanctions for Speed/ Alcohol/ Other Offences

The significant over-representation of young drivers in speeding related fatal crashes and much higher risk of crash fatality due to alcohol, even at low BAC levels, relative to older experienced drivers are strong justifications for specific sanctions on speeding and alcohol offences for young novices. Related to this are reduced demerit point thresholds for provisional drivers generally or higher demerit points for certain offences, as well as reduced maximum speed restrictions or mandatory good behaviour periods. Specific sanctions include mandatory participation in driver improvement programs following offences and mandatory alcohol interlocks when returning to driving following an alcohol offence. There is clear justification for these measures, with the exception of reduced maximum speed restrictions for which the limited research shows inconsistent results.

However, there have been limited if any specific evaluations of the effectiveness of these GDL components in terms of crashes and therefore few quantifiable results. The exception is the 10% reduced crash risk found for driving offenders aged under 25 who completed an on-line driver improvement program.

Another quantified benefit was a 10% reduction in offences for 16-year-olds when a 6-month good behaviour period was introduced.

11 From 28 July 2014, regression to a previous licence stage will be removed, in addition to other significant GDL changes (as detailed in Table 1 and its table notes).
6. Discussion

6.1 Summary of Results

Overall, evidence that each component addressed an important contributing factor to young driver crashes and injuries was found for all factors but not all components had been evaluated as part of GDL models or in relation to crash outcomes. Therefore the potential quantified benefits could not be provided for all components. A tabulated summary of this literature for each component is provided in Table 3.

The most well evaluated components, and therefore having the most examples of quantified benefits in terms of crash and/or injury reductions, were:

- a minimum learner age of 16 years,
- a minimum learner period of 12 months,
- minimum provisional age greater than 16 years (with increasing benefits with increasing age),
- night driving restrictions,
- peer passenger restrictions and
- a zero BAC limit.

There was some evidence for the effectiveness of setting a high number of supervised driving hours for learners (80-120 hours), and including hazard perception tests and exit tests in GDL models, but not on when was the best stage to introduce the hazard perception tests.

Emerging research suggested education programs to improve cognitive skill deficits, to build resilience and to involve parents had potential to reduce crashes but had not yet been adequately evaluated, while those focused on improving knowledge, awareness and/or attitudes were not effective and those reducing the length of the learner period or providing skid training were counterproductive.

There was no evaluation available in order to determine the optimal requirements for supervisory drivers, optimal length of the provisional period, or impact of introducing restrictions on mobile phones or other technology; nor for a range of specific measures to address speeding, alcohol and other offences. Vehicle power restriction evaluation suggested the impact would be limited but primarily due to limited ownership of high performance vehicles by young drivers.

It is important to distinguish in the evaluation of GDL components between negative, neutral, or inconclusive findings versus the absence of any evaluation or limited evaluation (second summary column in Table 3). The latter cannot be deemed to lack effectiveness or to suggest the component should not be introduced; particularly if there is clear evidence that the component addresses an important risk factor (first summary column).

Australasia has a strong track record of ‘taking a chance’ in these situations and leading the world in introducing road safety regulations to address known contributing factors to crashes and injury, and typically with great success. This includes New Zealand being the first country to introduce a comprehensive GDL model incorporating both night and passenger restrictions, which have been among the most effective features of GDL for all jurisdictions. (This also applies to Victoria being the first to mandate seatbelt use, as another Australasian example.) Therefore, a lack of evaluation and entry of ‘unknown’ impact should not be interpreted as a recommendation not to include that GDL component. Rather, more evaluation is needed to quantify the expected benefits.
### Table 3. Summary of the research evidence on graduated driver licensing components

<table>
<thead>
<tr>
<th>GDL Component</th>
<th>Evidence component addresses contributing factor to young driver crashes/injuries</th>
<th>Evidence introducing component reduces young driver crashes/injuries</th>
<th>Examples of potential impact of introducing component on young driver crashes/injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minimum learner age</strong></td>
<td>Crash evaluations plus neurobiological development research identify young age as risk factor</td>
<td>Crash, fatal crash and insurance claims research support minimum age 16</td>
<td>Age 16: 13% reduction in fatal crashes of 15-17-year-olds compared to min 15 years; 15% reduction in crashes of P drivers compared to min 17½ years</td>
</tr>
<tr>
<td><strong>Minimum learner period</strong></td>
<td>Sufficient time needed to maximise depth and breadth of experience before Ps; also setting minimum can increase P age and reduce risk this way, not only due to improved experience</td>
<td>Greater crash, casualty crash reductions for 12 months than 6 months; 24 months can further reduce if additional supervised driving undertaken</td>
<td>12 months: 13% reduction in fatal crashes of 15-17-year-olds; 9% reduction in collision claims of 16-year-olds; min 26% reduction in fatal crashes of 16-year-olds, 17% of 17-year-olds</td>
</tr>
<tr>
<td><strong>Minimum learner supervised driving hours</strong></td>
<td>Few hours results in less varied and less complex experience likely required to protect against crashes; experience driving at night or in darkness can be particularly limited</td>
<td>Some evidence (mainly modelling-based) that more hours associated with improved crash outcomes, with optimal experience calculated as 5,000 to 7,000km (likely equating to about 80-100 hours minimum to about 120-140 hours maximum); minimum should also be set for night driving but optimal amount yet to be determined.</td>
<td></td>
</tr>
<tr>
<td><strong>Supervisory driver requirements</strong></td>
<td>Full licence, age 25, zero BAC and potentially offence-free periods could control for risk; unknown whether less stringent requirements are adequate or more stringency is required; minimum age must at least be commensurate with peer passenger restriction</td>
<td>No evaluations evident</td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Formal education requirements</strong></td>
<td>Inexperience strongest contributor to young driver crash risk; evidence of cognitive skill deficits related to crash risk and that these can improve with targeted higher-order skills training; emerging evidence that resilience education and including parents in GDL education/ training initiatives can reduce crashes</td>
<td>Limited evaluations within GDL models or in relation to crashes; knowledge/ awareness/ attitude (only) focused programs do not reduce crashes; programs that allow reduced L periods and provisional skid-training programs can increase crashes</td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Licence tests</strong></td>
<td>Establish a baseline of knowledge and skills required to progress through GDL with a focus on capabilities important for reducing crash risk</td>
<td>L to P knowledge and on-road tests inconsistent findings, hazard perception tests can reduce crashes; P1 to P2 hazard perception test can reduce at-fault crashes; Exit test can reduce crashes in following year</td>
<td>Unknown impact of introducing licence tests, but lower crash rates for those who pass licence tests on their first attempt. Hazard perception test: 3% reduction in crashes when tested at L to P transition, 10% reduction in at-fault crashes and 17% reduction in at-fault injury crashes when tests at P1 to P2 transition if pass first attempt Exit test: 16% reduction in crashes in following year if pass first attempt (19% reduction for knowledge subtest, 5% reduction for hazard perception subtest)</td>
</tr>
</tbody>
</table>
## Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

<table>
<thead>
<tr>
<th>GDL Component</th>
<th>Evidence component addresses contributing factor to young driver crashes/injuries</th>
<th>Evidence introducing component reduces young driver crashes/injuries</th>
<th>Examples of potential impact of introducing component on young driver crashes/injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum provisional age</td>
<td>Crash evaluations plus neurobiological development research identify young age as risk factor, particularly independent driving at age 16 or younger</td>
<td>Crash, fatal crash / fatalities and insurance claim evaluations all show increased benefits at higher ages with age 17 better than 16 and age 18 better than 17</td>
<td>16½-17 vs 16: 23% reduction in fatal crashes of 16-year-olds 17 vs 16: 13% reduction in fatal crash rates of 15-17-year-olds, 9% reduction in insurance claims 18 vs 17: 20% reduction in crashes of 16-24-year-olds 18 vs 16: 12% reduction in crashes, 24% reduction in fatalities of P drivers</td>
</tr>
<tr>
<td>Minimum provisional period</td>
<td>Alcohol-related research demonstrates increased crash and fatality risk even at low alcohol levels until age 21 in particular, as well as 20-29; this suggests min. period set should extend from min. holding age to age 21, if not longer, in relation to a zero BAC</td>
<td>No evaluations evident</td>
<td>Unknown</td>
</tr>
<tr>
<td>Night driving restriction</td>
<td>Crash risk is greater at night for all drivers and exacerbated by inexperience and young age</td>
<td>Reductions in crashes and fatal crashes at night and during the day and in collision claims for restrictions varying in length of tenure and start/end times; earlier start times yield greater benefits</td>
<td>Age 16: 16-59% reduction in night crashes, 9-22% reduction in day crashes  Age 16-17: 49% reduction in night crashes, 5% reduction in day crashes; 35-36% reduction in severe or fatal injury in restricted hours and 17-28% overall; 10% reduction in all fatal crashes  Age 17: 40% reduction in night crashes, 25% reduction in day crashes; for fatal crashes 44% night, 21% day  By start times: 10pm or earlier: 19% reduction in crashes 9pm: 18% reduction in fatal crashes; 12% reduction in collision claims 12am: 12% reduction in fatal crashes; 8% reduction in collision claims</td>
</tr>
<tr>
<td>Peer passenger restriction</td>
<td>Crash evaluations plus neurobiological development research identify young age as risk factor, due to both heightened distraction and sensation seeking; risk increases incrementally with each additional peer-aged passenger</td>
<td>Reductions in crashes, fatal crashes, and fatal and injury crashes combined and in collision claims for restrictions varying in length of tenure and by number and age range of passengers restricted</td>
<td>One peer passenger only: 20% reduction in fatal crashes; 6% reduction in collision claims of 16-year-olds; 12% reduction in fatal crashes of 17-year-olds; 7% reduction in fatal crashes of 15-17-year-old drivers. No peer passengers: 20% reduction in fatal and injury crashes of 16-year-old drivers, 21% reduction in fatalities and injuries of their peer passengers; 25% reduction in involvement of peer passengers in crashes of 16-year-old drivers; 21% reduction in fatal crashes of drivers aged 15-17 years</td>
</tr>
</tbody>
</table>
### Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

<table>
<thead>
<tr>
<th>GDL Component</th>
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<th>Examples of potential impact of introducing component on young driver crashes/injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BAC limit</strong></td>
<td>Impact of even small amounts of alcohol on crash risk and fatal crash is even greater for young novices than older experienced drivers</td>
<td>Zero BAC limits reduce alcohol-related fatal crashes, fatal and injury crashes, and night-time single vehicle crashes significantly greater than other limits (including low levels such as 0.02%)</td>
<td>Zero BAC: 9-24% reduction in alcohol-related fatal crashes of 15-19-year-olds; 4-17% reduction in fatal and injury crashes of 15-19-year-olds; 22% reduction in night-time single vehicle fatalities (compared to 17% with a 0.02% BAC limit and 7% with a 0.04-0.05% limit)</td>
</tr>
<tr>
<td>Mobile phone / other technology restriction</td>
<td>Even hands-free phone use substantially increases crash risk for all drivers, exacerbated by inexperience and young age; when using phone, young drivers show considerable deficits in attention and driving performance</td>
<td>Limited research; inconsistent impact on phone use when driving; only one evaluation on crashes found no effect but in jurisdiction lacking police enforcement; no evaluations of other technology</td>
<td>Unknown</td>
</tr>
<tr>
<td>Vehicle power restriction</td>
<td>Drivers aged &lt;25 of high performance vehicles have higher crash injury risk</td>
<td>Modelling assuming 100% compliance shows injury reductions but prevalence of ownership low</td>
<td>Injury reductions ranging from 0-4-1.8% (Australia) to 2.2-2.5% (New Zealand)</td>
</tr>
<tr>
<td>Specific sanctions for speed, alcohol or other offences</td>
<td>Support to include specific sanctions for speeding and alcohol offences, including alcohol interlocks, and generally to include demerit point systems and good behaviour periods</td>
<td>Limited evaluation: inconsistent findings on effectiveness of maximum speed restrictions; one example of driver improvement program reducing crash risk</td>
<td>Unknown generally; one study demonstrated 10% reduced crash risk following completion of on-line driver improvement program</td>
</tr>
</tbody>
</table>

Note: L = Learner (permit/licence); P = Provisional (probationary/intermediate licence); P1 = first stage provisional licence (typically 12 months); P2 = second stage provisional licence (sometimes applicable in Australian GDLs)

### 6.2 Limitations and Other Considerations

There are other limitations to the present review and additional potential for misinterpretation of the findings to be addressed. GDL operates as a system and there are only rare instances where multiple jurisdictions have identical systems at any level. Therefore, isolating components for analysis is not only challenging but also potentially misleading when comparing across similar but nevertheless different systems.

For example, in North American jurisdictions, where much of the comparative evaluation research originates, the minimum entry (learner) age is as young as 14 in some jurisdictions and up to 16 years in others. Learner periods vary from a minimum of none to 12 months and various provisional conditions can vary from six months to two years. In the United States, all requirements and restrictions only apply to age 18 in all but one state, while in Canada they apply to drivers of all ages, and in Australasia some apply only to the early-to-mid 20s. There are no two identical systems in Australasia, and no Australasian model is identical to a North American model. Therefore, comparisons of the effectiveness of specific requirements and restrictions within these differing licensing stages might well be influenced by these differences and current evaluation approaches might not be sensitive to these differences.

In addition, evaluation designs and statistical analyses employed vary widely across studies, from less reliable simple pre-post comparisons without control groups to account for other potential unmeasured influences on crashes, to powerful interrupted time series analysis (Mayhew et al. 2005). While these differences were taken into account when presenting the research, the examples of quantified benefits included in Table 3 do not readily reflect this information.
Moreover, the effect of any one component will depend on what other components are already in place. Therefore, introducing a component into an otherwise weak GDL model could be expected to have a greater impact than when introduced into a stronger model. For example, the size of the potential reduction in crash involvement due to introducing night or passenger restrictions for provisional drivers would be expected to be much greater when the minimum age is 16 years compared to 18 years by virtue of the cohort’s younger age, less advanced neurobiological development and already higher crash rate; albeit this should not be interpreted as those restrictions having less value at older ages. Therefore percentage differences in reductions in different evaluation studies of the same GDL component cannot always be directly compared. In the UK cohort study (Forsyth et al. 1995), for example, while the crash risk for those licensed at age 18 was 9% lower than those licensed at 17 years overall, one year of driving experience was shown to decrease the crash risk of 17-year-olds by 38% compared to 35% for 18-year-olds.

In essence, the fatalities and injuries arising from young novice driver crashes are what is particularly important and these numbers and therefore percentage reductions might appear lower than for crashes per se, but still represent substantial benefits. This level of information was not available for all components and so the information in the final column of Table 3 is not directly comparable across the different components but subject to whatever examples were available in the literature. The lack of common age groups and outcomes applying across all the components prevented reporting according to a single indicative scale of potential impact.

Further, estimating the range of benefits that might be expected in Australasia based on North American evaluations could also differ due to variations in compliance. Compliance can vary greatly depending on enforcement practices and intensity and these can vary widely across jurisdictions. In North America, there are no requirements to display P plates (with the exception of New Jersey; see Curry et al. 2013 for discussion) and drivers can typically only be pulled over by police (when a licence can be requested) if they appear to be driving illegally. Therefore enforcement of GDL requirements such as night, passenger and mobile phone restrictions is challenging and breaches are unlikely to be detected by police in the absence of other moving violations. It is generally parents and not the police who are considered the chief enforcers of GDL in North America. Parental understanding and acceptance of GDL is therefore considered a key aspect of its effectiveness (and this is generally strong, although varies depending on the GDL component; e.g. Williams, Braitman & McCartt 2011). This contrasts to Australasia where random police checks are typically allowed and all Australian jurisdictions require display of P plates. Therefore police influence on compliance might be greater than parental influence, particularly among older novices compared to their younger US counterparts.

A further limitation of the present research is that the majority of studies reviewed were population-based studies or selected samples of young novice drivers that generally did not account for potential subgroup differences (apart from age and to some extent gender), such as socioeconomic or other disadvantage. Such factors also contribute to young driver crash and injury risk, with low socioeconomic youth at considerably higher risk of a fatality crash or serious injury than high socioeconomic youth, even when controlling for urban/rural residence (e.g., Chen, Jan, Boufous, Martiniuk, Ivers, Senserrick & Norton 2012; Chen, Senserrick, Martiniuk, Ivers, Boufous, Chang & Norton 2010).

When considering introducing or strengthening a GDL component a balance is needed between ensuring the most promising GDL model for the majority of young drivers, but also ensuring that disadvantaged youth are not unduly further disadvantaged. This can be addressed by introducing additional support programs or through exemptions or alternative requirements in certain circumstances. Inclusions of exemptions in licensing systems can be contentious. While disadvantaged youth should not be precluded from learner and provisional conditions and experience that can best protect them against crash risk, if the alternative is that they have no access to the licensing system, this could cause more harm in preventing them from overcoming their disadvantage (such as access to education and employment, associated with improved health) and potentially increase unlicensed driving. Exemptions need not simply waiver requirements, however, but replace them with other alternatives that still ensure minimum standards are met.
Several of the GDL components reviewed could have significantly different impacts in different Australasian jurisdictions due to considerable disparities in disadvantage, population size and geographical spread. For example, New South Wales (population 7.2m, 2.2% indigenous, density 9.0 persons/km²) and Victoria (population 5.5m, 0.7% indigenous, density 24.4 persons/km²) account for more than half of the Australian population where residents are largely concentrated in urban or numerous rural centres. This compare sharply to the Northern Territory (population 229,711, 30.4% indigenous, density 0.2 persons/km²) with a much smaller population – and therefore fewer resources for licensing support initiatives – and diverse spread of residents outside of the capital, Darwin, and regional centres of Alice Springs and Katherine. The higher proportion of Aboriginal and Torres Strait Islander residents in the Northern Territory also indicates challenges in introducing stricter GDL components.

Aboriginal communities have been found to have multiple barriers to achieving licensing, more so than the general population (Clapham, Senserrick, Ivers, Lyford & Stevenson 2008; Elliott & Shanahan Research 2008). These include requirements such as proof of identity documents and challenges completing English language and computerised tests, but also limited access to suitable supervisory drivers and/or vehicles in which to provide all eligible learner drivers with supervised driving (Clapham et al. 2008; Elliott & Shanahan Research 2008). Therefore, increasing required hours to high levels (such as 100-120 hours) could further disadvantage young people in these communities from achieving independent licensure. For those with low socioeconomic backgrounds, the cost to undertake a substantial number of lessons through professional lessons is prohibitive.

While achieving a high number of supervised hours is important to increase safety, research has shown that such barriers to licensing can result in a high level of unlicensed driving. For example, research in 12 urban, regional and remote Aboriginal communities in NSW found 29% of those never licensed reported driving, perceiving it as a necessity in their community with limited public transport options; 40% of which included driving on a weekly basis (Elliott & Shanahan Research 2008). Further 46% of those previously but not currently licensed reported driving on a daily basis. Unlicensed driving is not only a significant crash risk factor but also a contributor to the over-representation of Aboriginal people in custody (Lam 2003; Macaulay, Thomas, Mabbot, Styles, Edmonston, Sheehan & Schonfeld 2003; Watson 2013).

In some remote communities, short-term support programs can assist with sourcing documentation and understanding testing protocols and provide intensive supervised experience to bring drivers up to licensing standards over several weeks. Such programs have been successfully implemented in remote Aboriginal communities and in prison populations for example (Macaulay et al. 2003). Introducing lengthy learner periods however reduces the capacity of such programs when individuals need to complete learner test requirements and provisional test requirements 12 months apart. Therefore, while lengthy learner periods and a high number of supervised hours are more protective against provisional crash risk, introducing these can work against these intensive short-term support programs.

Learner driver mentoring programs, that provide supervisory drivers and vehicles for disadvantaged learners are an important development in this regard. There is increasing evidence that such programs are effective in helping learners achieve the minimum hours required and to gain provisional license; including up to 120 hours in Victoria, which currently provides the best example of coordinated programs throughout the state (Freethy 2012). This contrasts with other Australian jurisdictions, where no such programs were identified in a 2009 review (Youthsafe 2009); although additional support programs are emerging (e.g. Job & Bin-Sallik 2013). Such programs are likely to be needed in jurisdictions changing from none or low to high mandated hours.

Therefore, when strengthening GDL models it is important to consider whether sufficient support programs exist to ensure access to licensing is feasible (such as learner mentoring programs). Alternatively, consideration could be given to exempting some requirements, due to factors such as disadvantage and remoteness, or replacing with alternatives that ensure baseline requirements and standards are still met (such as intensive short-term driving programs in remote areas).

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12 Statistics for all jurisdictions in this paragraph were sourced from the National Regional Profile 2006-2010 on the Australia Bureau of Statistics website: www.abs.gov.au.
New South Wales provides a recent example of such an alternative initiative for residents in remote areas, effective 1 July 2013. Under a Pilot Program, young people can apply for a restricted P1 licence in three remote NSW areas after completing at least 50 supervised driving hours, restricted only for the purposes of driving to work, education and medical appointments. The restricted licence condition applies for the first six months and then converts to the standard P1 licence. This provides an example of an option in relation to the otherwise 120 supervised hours requirement (including 3-for-1 scheme), but with all other GDL learner requirements still met. While this is too recent to have been evaluated, it is noteworthy that an evaluation of restricted work licences for traffic offenders was conducted in Queensland in 1997 (Watson & Siskind 1997). Even focused on a high risk group in terms of alcohol offenders, this cohort study of over 1,700 drink drivers found that those allowed to drive on such restricted licences appeared to have a lower rate of recidivism or at least a rate not statistically different from those disqualified. While not examined directly, this suggests such licences can have a role in allowing driving without unduly increasing crash risk.

The minimum provisional age set also is important to consider in terms of potential disadvantage, particularly in regional and remote areas without public transport options. The age of independent driving has implications beyond crash involvement that also need to be considered, including potential impacts on access to education, employment and health services. While Victoria sets age 18 with restrictions, it does not have vast remote areas with extreme distances to public transport alternatives such as those found in Northern Territory, for example. Particularly in jurisdictions with a minimum provisional age below 17 years and young minimum school leaving ages, impact assessments might point to 17 years as more acceptable, achievable and unlikely to cause undue disadvantage than age 18 in that jurisdiction. Conversely, jurisdictions with sufficient public transport and support services available and older minimum school leaving ages could more strongly consider a minimum provisional age of 18 years.
7. Concluding Comments

This work has been completed based on existing evaluations, with many arising from the United States. This is despite Australasia offering the contrasting GDL models needed for comparative evaluations, including pre and post evaluations within jurisdictions. Several such evaluations are in progress but nonetheless Table 3 shows there are clear gaps in the evidence that will require further attention. Each jurisdiction should monitor this in-progress and on-going research, but also evaluate their own data to the extent possible to ensure the appropriateness of each GDL component for their jurisdiction.

It is worth noting that a GDL model comprised of the strongest GDL components reported in the literature does not equate to a model that currently exists and has been tested as a unified model. Jurisdictions might choose to introduce additional components or strengthen existing components gradually based on specific local conditions and considerations.

Jurisdictions should also consider releasing a public discussion paper prior to introducing significant changes in order to stimulate and canvass public debate. This can provide insights such as where anticipated resistance might be minimal or identify issues not yet considered. This approach has been undertaken successfully previously in several Australasian jurisdictions (for example, Department for Transport, Energy and Infrastructure 2011; Queensland Transport 2005; Roads and Traffic Authority of NSW 2004; VicRoads 2005). VicRoads has also reported\(^{13}\) that a series of learner driver surveys undertaken prior to introducing 120 hours of supervised practice showed practice was increasing over time as Victoria rolled out a range of public education and behavioural support materials. They recommended an on-going strategic program of professionally developed persuasive communications and education directed at both parents and learners to make the case for 120 hours experience with each new cohort as they move through the system each year; involving some mass media initially, targeted support materials with strategies about how to go about the process, addressing myths and excuses, and support programs for disadvantaged learners.

Another approach undertaken in the United States at a national level that could be considered for Australasia is that taken by the IIHS with their initial rating system (as detailed in the footnote on page 3) and subsequent on-line GDL calculator. The initial rating system was first used in a benchmarking initiative hosted on their website, where a map of the US was colour coded by states according to the strength of their GDL models. This allowed a snapshot of the current strength of GDL that incrementally improved over time, until nearly all states were achieving ‘good’ ratings. As previously noted in section 5.3, the IIHS now hosts an on-line calculator with data generated from their national GDL evaluation (McCartt, et al. 2010). This allows a jurisdiction to select and calculate immediately their potential for additional crash reductions by introducing or strengthening certain GDL initiatives to those already in place. This provides a useful and likely persuasive, motivating tool for policymakers, advocates and the general public alike. Striving for high quality evaluations of contrasting initiatives that Australasia has to offer could allow such a tool to be developed in our region and therefore support future campaigns to help strengthen our GDL systems to continue to protect young lives from road trauma.

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\(^{13}\) This information was provided by VicRoads in 2012 in review comments for the purposes of this report.
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### Appendix A: North American GDL Models

#### A.1 United States (Insurance Institute for Highway Safety, 2013)

<table>
<thead>
<tr>
<th>State</th>
<th>Learner stage</th>
<th>Intermediate stage: restrictions on driving while unsupervised</th>
<th>Unrestricted stage: minimum age at which restrictions may be lifted</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum entry age</td>
<td>Mandatory holding period</td>
<td>Minimum amount of supervised driving</td>
<td>Minimum age</td>
</tr>
<tr>
<td>Alabama</td>
<td>15&lt;sup&gt;14&lt;/sup&gt;</td>
<td>6 months&lt;sup&gt;14&lt;/sup&gt;</td>
<td>30 hours&lt;sup&gt;14&lt;/sup&gt; (none with driver education)</td>
<td>16</td>
</tr>
<tr>
<td>Alaska</td>
<td>14</td>
<td>6 months</td>
<td>40 hours, 10 of which must be at night or in inclement weather</td>
<td>16</td>
</tr>
<tr>
<td>Arizona</td>
<td>15, 6 months&lt;sup&gt;15&lt;/sup&gt;</td>
<td>6 months</td>
<td>30 hours, 10 of which must be at night (none with driver education)</td>
<td>16</td>
</tr>
<tr>
<td>Arkansas</td>
<td>14&lt;sup&gt;16&lt;/sup&gt;</td>
<td>6 months&lt;sup&gt;16&lt;/sup&gt;</td>
<td>none</td>
<td>16&lt;sup&gt;17&lt;/sup&gt;</td>
</tr>
<tr>
<td>California</td>
<td>15, 6 months&lt;sup&gt;18&lt;/sup&gt;</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night</td>
<td>16&lt;sup&gt;18&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>14</sup> In Alabama, the supervising driver must be a parent, guardian or driving instructor. At age 16, permit holders may drive with a licensed driver who is at least 21 years old.

<sup>15</sup> In Arizona, a driver education instructor can authorize an enrolled student who is 15 to drive only while supervised by the authorizing instructor.

<sup>16</sup> In Arkansas, 14 year-olds can drive with an instruction permit after passing a written test. After passing a road test they are eligible for a learner licence. Unsupervised driving is not permitted by holders of either the instruction permit or learner licence. The combined holding period for the permit and learner licence is six months.

<sup>17</sup> In Arkansas, applicants for an intermediate licence must be 16 and must be crash/violation-free for six months. Licensees younger than 18 are prohibited from transporting passengers who are unrestrained.

<sup>18</sup> In California, students enrolled in driver education may drive while supervised by an instructor. Licence applicants who do not take driver education must wait until age 18 for a licence. They are not required to go through an intermediate licence stage.
<table>
<thead>
<tr>
<th>State</th>
<th>Minimum entry age</th>
<th>Mandatory holding period</th>
<th>Minimum amount of supervised driving</th>
<th>Minimum age</th>
<th>Unsupervised driving prohibited</th>
<th>Restriction on passengers (family members excepted unless otherwise noted)</th>
<th>Night time restrictions</th>
<th>Passenger restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td>15&lt;sup&gt;19&lt;/sup&gt;</td>
<td>12 months</td>
<td>50 hours, 10 of which must be at night</td>
<td>16</td>
<td>midnight-5 am secondary enforcement</td>
<td>first 6 months—no passengers; second 6 months—no more than one passenger secondary enforcement</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Connecticut</td>
<td>16&lt;sup&gt;20&lt;/sup&gt;</td>
<td>6 months&lt;sup&gt;20&lt;/sup&gt;</td>
<td>40 hours&lt;sup&gt;20&lt;/sup&gt;</td>
<td>16, 4 months&lt;sup&gt;20&lt;/sup&gt;</td>
<td>11 pm - 5 am</td>
<td>first 6 months—no passengers other than parents or a driving instructor; second 6 months—no passengers other than parents, driving instructor or members of the immediate family</td>
<td>18</td>
<td>17, 4 mos.</td>
</tr>
<tr>
<td>Delaware</td>
<td>16&lt;sup&gt;21&lt;/sup&gt;</td>
<td>6 months&lt;sup&gt;21&lt;/sup&gt;</td>
<td>50 hours, 10 of which must be at night&lt;sup&gt;21&lt;/sup&gt;</td>
<td>16, 6 months&lt;sup&gt;21&lt;/sup&gt;</td>
<td>10 pm-6 am&lt;sup&gt;21&lt;/sup&gt;</td>
<td>no more than 1 passenger&lt;sup&gt;21&lt;/sup&gt;</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>16&lt;sup&gt;22&lt;/sup&gt;</td>
<td>6 months</td>
<td>40 hours in learner stage; 10 hours at night in intermediate stage</td>
<td>16, 6 months&lt;sup&gt;23&lt;/sup&gt;</td>
<td>September–June: 11 pm-6 am Sun.–Thur., 12:01 am-6 am Sat.–Sun.; July–August: 12:01 am-6 am</td>
<td>first 6 months—no passengers; thereafter, no more than 2 passengers&lt;sup&gt;23&lt;/sup&gt;</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

<sup>19</sup> In Colorado, the minimum permit age varies. Fifteen year-olds who are enrolled in driver education may apply for an instruction permit. Their supervising driver must be a parent, stepparent, grandparent, guardian, or driving instructor. At age 15, 6 months, driver education is no longer required, but applicants for this permit must have completed a four hour driver awareness program. At 16, young drivers may apply for a permit that allows driving while supervised by a licensed driver age 21 or older.

<sup>20</sup> In Connecticut, either driver education or home training is required for licence applicants younger than 18. Permit holders may not carry any passengers aside from the person providing instruction, parents or guardians. Time spent practice driving with a professional instructor counts toward the 40-hour certification requirement. Before an applicant who under 18 may take the driver’s test, parents or guardians must attend two hours of instruction regarding teen driving laws and related issues with such applicant. Anyone 18 years of age or older must hold an adult learner permit for three months before obtaining a driver licence.

<sup>21</sup> In Delaware, a driver education student does not need a permit to drive with a driver education instructor. After completing the on-road requirements of driver education, a driver education student who is at least 15 years, 10 months may apply for a Driver Education Learner's Permit, which allows the student to drive while supervised by an experienced driver. Upon completion of driver education, and if the student passes both the road and written tests, the student receives a Level 1 permit that for the first six months allows driving only while supervised. There also is a passenger restriction during the first six months of the Level 1 permit. No more than one passenger (family members excepted) is permitted in addition to the supervising driver. The Level 1 permit for the second six months is the equivalent of an intermediate licence. During that period, holders may drive unsupervised between 6 am and 10 pm and may only carry one passenger. Applicants for a driver's licence who are younger than 18 must have held a Driver Education Learner's Permit and/or a Level 1 permit for at least 12 months. Driver education is required for all licence applicants younger than 18.

<sup>22</sup> In the District of Columbia, the learner stage is mandatory for all licence applicants, regardless of age. A nighttime restriction (9 pm-6 am) applies in the learner stage.

<sup>23</sup> In the District of Columbia, licence applicants younger than 21 must go through the intermediate stage until they have completed it or until they turn 21.
<table>
<thead>
<tr>
<th>State</th>
<th>Learner stage</th>
<th>Intermediate stage: restrictions on driving while unsupervised</th>
<th>Unrestricted stage: minimum age at which restrictions may be lifted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum entry age</td>
<td>Mandatory holding period</td>
<td>Minimum amount of supervised driving</td>
</tr>
<tr>
<td>Florida</td>
<td>15 24</td>
<td>12 months</td>
<td>50 hours, 10 of which must be at night</td>
</tr>
<tr>
<td>Georgia</td>
<td>15</td>
<td>12 months</td>
<td>40 hours, 6 of which must be at night</td>
</tr>
<tr>
<td>Hawaii</td>
<td>15, 6 months</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night</td>
</tr>
<tr>
<td>Idaho</td>
<td>14, 6 months   27</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night</td>
</tr>
<tr>
<td>Illinois</td>
<td>15 28</td>
<td>9 months</td>
<td>50 hours, 10 of which must be at night</td>
</tr>
</tbody>
</table>

24 In Florida, learners permit holders may not drive after sunset for the first three months and thereafter may not drive after 10 pm.
25 In Georgia, licence applicants younger than 17 must have completed driver education.
26 In Hawaii, licence applicants younger than 18 must have completed driver education.
27 In Idaho, licence applicants younger than 17 must have completed driver education. There are three classes of learner permits — a training instruction permit for people 14, 6 months taking driver education; a supervised instruction permit for practice driving with a nonprofessional supervisor; and an instruction permit for people younger than 17 who have completed driver education and supervised driving or for people 17 and older without either driver education or supervised driving.
28 In Illinois, enrollment in driver education is required for permit applicants age 15; without driver education, a permit applicant must be age 17, 3 months.
29 In Illinois, licence applicants 18 and older are not required to have driver education or to go through and intermediate licence stage.
### Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

#### State

<table>
<thead>
<tr>
<th>State</th>
<th>Learner stage</th>
<th>Intermediate stage: restrictions on driving while unsupervised</th>
<th>Unrestricted stage: minimum age at which restrictions may be lifted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum entry age</td>
<td>Mandatory holding period</td>
<td>Minimum amount of supervised driving</td>
</tr>
<tr>
<td>Indiana</td>
<td>15 30</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night</td>
</tr>
<tr>
<td>Iowa</td>
<td>14</td>
<td>12 months</td>
<td>20 hours, 2 of which must be at night 30</td>
</tr>
<tr>
<td>Kansas</td>
<td>14 34</td>
<td>12 months</td>
<td>25 hours, in learner phase; 25 hours before age 16; 10 of the 50 hours must be at night 34</td>
</tr>
<tr>
<td>Kentucky</td>
<td>16 35</td>
<td>6 months 35</td>
<td>60 hours, 10 of which must be at night 35</td>
</tr>
</tbody>
</table>

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30 In Indiana, driver education determines the minimum age for permits and the intermediate licence. People enrolled in or who have completed driver education must be age 15 to have a permit; otherwise, they must be age 16. The minimum age for an intermediate licence is 16, 6 months with driver education and 16, 9 months, without.

31 Iowa requires a certification of 10 additional hours of supervised driving during the intermediate stage, two of which must be at night.

32 In Iowa, driver education is required for an intermediate licence and for an unrestricted licence if the applicant is younger than 18.

33 In Iowa, parents are permitted to waive at the time of licensure a discretionary six-month passenger limit of no more than one unrelated passenger younger than 18, effective Jan. 1, 2014.

34 In Kansas, drivers age 15 but not yet 16 may be granted a restricted licence if they have completed driver training. Restricted licence holders younger than 16 may not drive unless supervised other than to and from school or work via the most direct route and may not carry minor passengers other than siblings. To get a restricted licence, applicants must have driven at least 25 of the 50 hours required for a full licence and must have held an instruction permit for 12 months.

35 Kentucky law prohibits learner permit holders from driving between midnight and 6 am or from carrying more than one passenger younger than 20 unless supervised by a driving instructor.

36 In Kentucky, licence holders younger than 18 must complete a driver education course or a state-sponsored traffic school.
<table>
<thead>
<tr>
<th>State</th>
<th>Minimum entry age</th>
<th>Mandatory holding period</th>
<th>Minimum amount of supervised driving</th>
<th>Minimum age</th>
<th>Unsupervised driving prohibited</th>
<th>Restriction on passengers (family members excepted unless otherwise noted)</th>
<th>Night time restrictions</th>
<th>Passenger restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Louisiana</td>
<td>15 37</td>
<td>6 months</td>
<td>50 hours, 15 of which must be at night</td>
<td>16 37</td>
<td>11 pm-5 am</td>
<td>no more than one passenger younger than 21 between the hours of 6 pm-5 am; no passenger restriction from 5 am-6 pm</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Maine</td>
<td>15 38</td>
<td>6 months 38</td>
<td>70 hours, 10 of which must be at night</td>
<td>16 38</td>
<td>midnight-5 am 38</td>
<td>first 9 months - no passengers 38</td>
<td>16, 9 mos.</td>
<td>16, 9 mos.</td>
</tr>
<tr>
<td>Maryland</td>
<td>15, 9 months</td>
<td>9 months 39</td>
<td>60 hours, 10 of which must be at night</td>
<td>16, 6 months</td>
<td>midnight-5 am 40</td>
<td>first 5 months - no passengers younger than 18 secondary enforcement</td>
<td>18</td>
<td>16, 11 mos.</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>16 41</td>
<td>6 months 41</td>
<td>40 hours 42</td>
<td>16, 6 months 43</td>
<td>12:30 am-5 am (between 12:30 am-1 am and 4 am-5 am the night driving and passenger restrictions are subject to secondary enforcement; enforcement is primary at all other times)</td>
<td>first 6 months - no passengers younger than 18 (between 12:30 am–1 am and 4 am–5 am the night driving and passenger restrictions are secondarily enforced; enforcement is primary at all other times)</td>
<td>18</td>
<td>17</td>
</tr>
</tbody>
</table>

37 In Louisiana, driver education is required for a permit and an intermediate licence if the applicant is younger than 18. People 18 and older must have completed a prelicensing training course including a minimum of 8 hours of behind-the-wheel instruction.

38 In Maine, driver education is required for a permit and a licence if the applicant is younger than 18. The learner permit holding period and the certification of practice driving applies to licence applicants younger than 21. The period of licence restrictions may extend beyond the person’s 18th birthday.

39 In Maryland, all licence applicants younger than 25 must hold a learner permit for nine months before taking the road test and all applicants 25 and older must hold the permit for 45 days.

40 In Maryland, the nighttime driving restriction only applies to intermediate licence holders younger than 18.

41 In Massachusetts, the night driving restriction for permit holders younger than 18 is midnight to 5 am, unless they are accompanied by a licensed parent or guardian.

42 In Massachusetts, the requirement for supervised driving is 30 hours for applicants who have successfully completed a driver skills development program in a closed, off-road course licensed by the Registrar of Motor Vehicles.

43 In Massachusetts, driver education is required of licence applicants younger than 18.
<table>
<thead>
<tr>
<th>State</th>
<th>Minimum entry age</th>
<th>Mandatory holding period</th>
<th>Minimum amount of supervised driving</th>
<th>Minimum age</th>
<th>Unsupervised driving prohibited</th>
<th>Restriction on passengers (family members excepted unless otherwise noted)</th>
<th>Night time restrictions</th>
<th>Passenger restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan</td>
<td>14, 9 months 44</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night</td>
<td>16 45</td>
<td>10 pm-5 am</td>
<td>no more than 1 passenger younger than 21</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Minnesota</td>
<td>15 46</td>
<td>6 months</td>
<td>30 hours, 10 of which must be at night 47</td>
<td>16 49</td>
<td>midnight-5 am</td>
<td>first 6 months - no more than 1 passenger younger than 20; second 6 mos.—no more than 3 passengers younger than 20</td>
<td>16, 6 mos.</td>
<td>17</td>
</tr>
<tr>
<td>Mississippi</td>
<td>15</td>
<td>12 months 50</td>
<td>none</td>
<td>16 51</td>
<td>10 pm-6 am Sun.-Thur., 11:30 pm-6 am Fri.-Sat.</td>
<td>none</td>
<td>16, 6 mos.</td>
<td>none</td>
</tr>
<tr>
<td>Missouri</td>
<td>15</td>
<td>6 months</td>
<td>40 hours, 10 of which must be at night 48</td>
<td>16</td>
<td>1 am-5 am</td>
<td>first 6 months—no more than 1 passenger younger than 19; thereafter, no more than 3 passengers younger than 19</td>
<td>17, 11 mo.</td>
<td>17, 11 mo.</td>
</tr>
<tr>
<td>Montana</td>
<td>14, 6 months 52</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night 53</td>
<td>15</td>
<td>11 pm-5 am</td>
<td>first 6 months—no more than 1 passenger younger than 18; second 6 months—no more than 3 passengers younger than 18</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

44 In Michigan, permit applicants younger than 18 must have completed the first segment of driver education.
45 In Michigan, licence applicants younger than 18 must have completed the second segment of driver education. Neither driver education nor an intermediate licence is required for licence applicants 18 and older.
46 In Minnesota, permit applicants younger than 18 must be enrolled in driver education. An optional 90-minute supplemental curriculum for parents is to be established by July 1, 2014, to provide information concerning graduated licensing, safety risks and the potential influence of adults on driving behavior.
47 In Minnesota, licence applicants younger than 18 must have completed driver education.
48 In Minnesota, provisional licence holders must be crash-free to qualify for a full licence.
49 In Mississippi, licence applicants younger than 18 must have completed the 12-month learner permit holding period.
50 In Mississippi, licence applicants 17 and older are exempt from the requirement to get an intermediate licence.
51 In Montana, enrolment in or completion of driver education is required for permit applicants younger than 15.
52 In Montana, licence applicants younger than 16 must have completed driver education.
<table>
<thead>
<tr>
<th>State</th>
<th>Learner stage</th>
<th>Intermediate stage: restrictions on driving while unsupervised</th>
<th>Unrestricted stage: minimum age at which restrictions may be lifted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum entry age</td>
<td>Mandatory holding period</td>
<td>Minimum amount of supervised driving</td>
</tr>
<tr>
<td>Nebraska</td>
<td>15 years old</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night (none with driver education)</td>
</tr>
<tr>
<td>Nevada</td>
<td>15, 6 months</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>15, 6 months</td>
<td>none</td>
<td>40 hours, 10 of which must be at night</td>
</tr>
<tr>
<td>New Jersey</td>
<td>16 years old</td>
<td>6 months</td>
<td>none</td>
</tr>
<tr>
<td>New Mexico</td>
<td>15 years old</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night</td>
</tr>
</tbody>
</table>

54 In Nebraska, 14 year-olds who live 1.5 miles or more from school and who either live outside or attend school outside a metropolitan area may be issued a learner permit (called an “LPE permit”) and a limited licence (called a “school permit”). The LPE permit authorizes supervised driving for the purpose of preparing for the school permit, which allows driving to and from school independently or anyplace else while supervised by a parent or guardian.

55 In Nevada, driver education is required of all licence applicants younger than 18 unless there is no driver education program offered within a 30-mile radius of the applicant’s residence.

56 New Hampshire does not issue learner permits. At age 15, 6 months a person can drive while supervised by a licensed driver 25 or older. Licence applicants who are younger than 18 must take driver education.

57 In New Jersey, the permit becomes an intermediate licence after six months for drivers younger than 21 and after 3 months for drivers 21 and older. The graduated licensing law applies to adults, except that the night driving and passenger restrictions are waived for new drivers 21 and older. If the applicant has not completed driver education, the minimum permit age is 17 and the minimum intermediate licence age is 17, 6 months. Learner permit holders may not drive between 11 pm and 5 am and may carry only one passenger in addition to the supervising driver or any parent, guardian or dependant.

58 In New Mexico, licence applicants younger than 18 must have completed driver education.

59 In New Mexico, permit applicants younger than 18 must be enrolled in driver education.
<table>
<thead>
<tr>
<th>State</th>
<th>Learner stage</th>
<th>Intermediate stage: restrictions on driving while unsupervised</th>
<th>Unrestricted stage: minimum age at which restrictions may be lifted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum entry age</td>
<td>Mandatory holding period</td>
<td>Minimum amount of supervised driving</td>
</tr>
<tr>
<td>New York</td>
<td>16 60</td>
<td>6 months</td>
<td>50 hours, 15 of which must be at night</td>
</tr>
<tr>
<td>North Carolina</td>
<td>15 61 62</td>
<td>12 months 62</td>
<td>60 hours, 10 of which must be at night, learner phase; 12 hours, 6 of which must be at night, intermediate phase</td>
</tr>
<tr>
<td>North Dakota</td>
<td>14</td>
<td>&lt;16: 12 months; 16: 6 months or until age 18, whichever comes first</td>
<td>&lt;16: 50 hours; ≥ 16: none</td>
</tr>
<tr>
<td>Ohio</td>
<td>15, 6 months</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night</td>
</tr>
</tbody>
</table>

60 In New York, the minimum age for an unrestricted driver licence is 18 (17 if the applicant has completed driver education). New York has a passenger restriction that applies to permit holders and licence holders younger than 18 (17 if the applicant has completed driver education).
61 In North Carolina, driver education is required for permit applicants younger than 18.
62 In North Carolina, learner permit holders may not drive between 9 pm and 5 am for the first six months.
63 In North Carolina, driver education is required for licence applicants younger than 18.
64 In North Carolina, a person who is at least 16 but younger than 18 must complete a minimum of 12 additional hours (six of which must be at night) of supervised driving to obtain a full provisional licence.
65 In Ohio, driver education is required of licence applicants younger than 18.
## Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

### State

<table>
<thead>
<tr>
<th>State</th>
<th>Learner stage</th>
<th>Intermediate stage: restrictions on driving while unsupervised</th>
<th>Unrestricted stage: minimum age at which restrictions may be lifted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum entry age</td>
<td>Mandatory holding period</td>
<td>Minimum amount of supervised driving</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>15, 6 months 66</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night 67</td>
</tr>
<tr>
<td>Oregon</td>
<td>15</td>
<td>6 months</td>
<td>50 hours 69 (100 hours without driver education)</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>16</td>
<td>6 months</td>
<td>65 hours, 10 of which must be at night and 5 of which must be in inclement weather</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>16 70</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night 71</td>
</tr>
<tr>
<td>South Carolina</td>
<td>15</td>
<td>6 months</td>
<td>40 hours, 10 of which must be at night</td>
</tr>
</tbody>
</table>

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66 In Oklahoma, 15 year-olds may drive, but only while supervised by an instructor.
67 In Oklahoma, learner permit holders may only operate a motor vehicle between the hours of 5 am and 10 pm.
68 In Oklahoma, a person who has been issued an intermediate Class D licence shall not operate a motor vehicle with more than one passenger unless all passengers live in the same household as the custodial legal parent or legal guardian or a licensed driver at least 21 years of age is actually occupying a seat beside the intermediate Class D licensee.
69 In Oregon, driver education is required of licence applicants younger than 18. However, it is waived for applicants who certify an additional 50 hours of supervised driving.
70 In Rhode Island, driver education is required of permit applicants younger than 18.
71 In Rhode Island, driver education is required of licence applicants younger than 18.
### Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

<table>
<thead>
<tr>
<th>State</th>
<th>Learner stage</th>
<th>Intermediate stage: restrictions on driving while unsupervised</th>
<th>Unrestricted stage: minimum age at which restrictions may be lifted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum entry age</td>
<td>Mandatory holding period</td>
<td>Minimum amount of supervised driving</td>
</tr>
<tr>
<td>South Dakota</td>
<td>14 72</td>
<td>6 months (3 months with driver education)</td>
<td>none 72</td>
</tr>
<tr>
<td>Tennessee</td>
<td>15 73</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night 73</td>
</tr>
<tr>
<td>Texas</td>
<td>15 74</td>
<td>6 months</td>
<td>20 hours, 10 of which must be at night 73</td>
</tr>
<tr>
<td>Utah</td>
<td>15 76</td>
<td>6 months</td>
<td>40 hours, 10 of which must be at night 76 77</td>
</tr>
<tr>
<td>Vermont</td>
<td>15 79</td>
<td>12 months</td>
<td>40 hours, 10 of which must be at night 79</td>
</tr>
</tbody>
</table>

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72 In South Dakota, learner permit holders may not drive between 10 pm and 6 am unless under the supervision of a parent or guardian.
73 Learner permit holders in Tennessee may not drive from 10 pm to 6 am.
74 In Texas, people who are 15 or older but under 18 must satisfactorily complete and pass the classroom phase of an approved driver education course to be issued a permit.
75 In Texas, the minimum licence age is 18 for applicants who have not completed driver education.
76 In Utah, permit holders younger than 18 may only drive under the supervision of a driving instructor, a parent or guardian, or a responsible adult who has accepted liability for the permit holder's driving by signing the permit application. Permit applicants younger than 19 must be enrolled in driver education.
77 In Utah, supervised driving in the learner stage may include up to five hours in a driving simulator.
78 In Utah licence applicants who are younger than 19 must have completed driver education.
79 In Vermont, driver education is required for licence applicants younger than 18.
### Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

#### Table: Summary of Graduated Driver License Requirements

<table>
<thead>
<tr>
<th>State</th>
<th>Learner stage</th>
<th>Intermediate stage: restrictions on driving while unsupervised</th>
<th>Unrestricted stage: minimum age at which restrictions may be lifted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum entry age</td>
<td>Mandatory holding period</td>
<td>Minimum amount of supervised driving</td>
</tr>
<tr>
<td>Virginia</td>
<td>15, 6 months 80</td>
<td>9 months 80</td>
<td>45 hours, 15 of which must be at night</td>
</tr>
<tr>
<td>Washington</td>
<td>15 82</td>
<td>6 months</td>
<td>50 hours, 10 of which must be at night</td>
</tr>
<tr>
<td>West Virginia</td>
<td>15 85</td>
<td>6 months 85</td>
<td>50 hours, 10 of which must be at night (none with driver education)</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>15, 6 months 86</td>
<td>6 months 86</td>
<td>30 hours, 10 of which must be at night 86</td>
</tr>
<tr>
<td>Wyoming</td>
<td>15</td>
<td>10 days</td>
<td>50 hours, 10 of which must be at night</td>
</tr>
</tbody>
</table>

**NOTE:** Passenger restrictions vary with regard to their durations, the ages of passengers to whom they apply, and the availability of exceptions. Most states have exceptions for passengers who are related to the driver or are members of the driver's household, and there are exceptions when a supervising driver is in the vehicle.

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80 In Virginia, the night driving restriction and passenger restrictions apply to learner permit holders.
81 In Virginia, driver education is required for licence applicants younger than 19 (18 if applicant holds a valid licence from another state). Northern Virginia and nearby counties have implemented a 90-minute segment for parents of driver education students.
82 In Washington, permit applicants must be enrolled in driver education; otherwise, the minimum permit age is 15, 6 months.
83 In Washington, driver education is required for licence applicants younger than 18.
84 In Washington, intermediate licence holders with a crash or violation history are ineligible for an unrestricted licence until age 18.
85 In West Virginia, learner permit holders younger than 18 may not drive between 10 pm and 5 am and may not carry more than two passengers in addition to the supervising driver.
86 In Wisconsin, enrolment in driver education is required for permit applicants younger than 18. During the learner stage, permit holders may carry three passengers if supervised by a driving instructor in a dual-control vehicle. Permit holders 16 and older may carry one passenger 25 or older who has been licensed at least two years.
87 In Wisconsin driver education is required for licence applicants younger than 18.
88 In Wyoming, all applicants for an unrestricted licence who are younger than 17 must have completed driver education and must have held an intermediate licence for at least six months.
## A.2 Canada (Traffic Injury Research Foundation, 2013)

### A.2.1 GDL New Drivers: Learner Stage (Stage 1) at a Glance

<table>
<thead>
<tr>
<th>GDL Component</th>
<th>PROVINCE TERRITORY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BC</td>
</tr>
<tr>
<td>Licence Class</td>
<td>7L</td>
</tr>
<tr>
<td>Age Requirement</td>
<td>Minimum Entry Age</td>
</tr>
<tr>
<td></td>
<td>Minimum Exit Age</td>
</tr>
<tr>
<td>Entry Requirements</td>
<td>Vision Test</td>
</tr>
<tr>
<td></td>
<td>Knowledge Test</td>
</tr>
<tr>
<td>Parental Consent: Age Applied</td>
<td>yes if under 19</td>
</tr>
<tr>
<td>Exit Requirements</td>
<td>Driver Education</td>
</tr>
<tr>
<td>Time Completion</td>
<td>12 months</td>
</tr>
</tbody>
</table>

---

89 Required high school driver training education (30 hours in class, 6 hours in car) or commercial training (six hours in-class and six hours in-car)
90 It comprises four phases of learning in which theory and practice alternate. The program totals 24 hours of theoretical training and 15 hours of practical training
91 Can be reduced to 8 months if a Ministry approved driver education course is successfully completed.
92 Can be reduced to 8 months if an approved driver education course is passed
93 Can be reduced to 3 months if a recognized driver education or training program is taken
94 Drivers must wait one year before first road test, or if enrolled in a driver education program, 275 days.
95 May be reduced to 8 months if an approved driver education course is passed
### Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

<table>
<thead>
<tr>
<th>GDL Component</th>
<th>Licence Class</th>
<th>PROVINCE TERRITORY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BC</td>
</tr>
<tr>
<td>Pass Test/Course</td>
<td>class 7 road test</td>
<td>Alberta basic road test</td>
</tr>
<tr>
<td>Stage Duration</td>
<td>Minimum Duration</td>
<td>12 months</td>
</tr>
<tr>
<td>Supervisory Driver</td>
<td>Age</td>
<td>25+</td>
</tr>
<tr>
<td>Licence Held</td>
<td>valid licence (class 1-5)</td>
<td>full licence experienced</td>
</tr>
<tr>
<td>BAC Level While Supervising</td>
<td>under 0.08</td>
<td>under 0.05</td>
</tr>
<tr>
<td>Location While Supervising</td>
<td>front passenger</td>
<td>front passenger</td>
</tr>
<tr>
<td>Supervised Driving</td>
<td>Minimum Amount</td>
<td>60 hours</td>
</tr>
<tr>
<td>Driver Restrictions and Conditions</td>
<td>BAC Level While Driving</td>
<td>0.0</td>
</tr>
</tbody>
</table>

---

96 2 years before having to re-qualify for the licence (by taking the vision and knowledge tests again)
97 5 years for exiting combined G1/G2 Graduated Licensing System
98 Non-probationary
99 No alcohol or drugs in supervisory driver’s system
100 Must be a Declaration stating that the minimum number of driving hours were completed and the parent/guardian/co-driver who taught the learner must sign the document well
## Summary of Literature of the Effective Components of Graduated Driver Licensing Systems

### GDL Component

<table>
<thead>
<tr>
<th>License Class</th>
<th>BC</th>
<th>AB</th>
<th>SK</th>
<th>MB</th>
<th>ON</th>
<th>QC</th>
<th>NB</th>
<th>NS</th>
<th>PEI</th>
<th>NL</th>
<th>YK</th>
<th>NWT</th>
<th>NU</th>
</tr>
</thead>
<tbody>
<tr>
<td>7L</td>
<td>12 am-5 am</td>
<td>12 am-5 am</td>
<td>12 am-5 am</td>
<td>12 am-5 am</td>
<td>12 am-5 am</td>
<td>none allowed</td>
<td>1 am-5 am</td>
<td>12 am-5 am</td>
<td>12 am-5 am</td>
<td>11 pm-6 am</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Night time Driving Restrictions

- 2 including supervisor
- # of working seat belts
- family and # of working seat belts
- # of seat belts

### Passenger Restrictions

- supervisor only
- no passengers
- family and supervisor
- supervisor only
- 1 and supervisor

### Road Restrictions

- no farm truck/off-road
- no 400 series roads

### "L" Sign/Plate

- yes
- yes
- yes

### Other Restrictions

- no electronics
- no electronics

### Suspensions/Prohibitions

#### Lower Driver Penalty Point Threshold

- 2 to 6 points instead of 15 to 19 points
- 7 points instead of 14 points
- 9 points instead of 15 points
- 4 points instead of 15 points
- Begin with 4 points, 2 added, up to 10 points
- 4 points instead of 12 points
- any amount of points leads to suspension
- 6 points instead of 12 points
- 7 points instead of 15 points
- 6 points

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101 Does not apply to individuals who are 21+ years of age
102 Not permitted to operate Class 3 vehicle (farm truck) or off-road vehicle along or across highways
103 General rules: four penalty points (usually 2 tickets) leads to one month prohibition. More points could lead to a longer prohibition
104 Any time spent suspended will have to be made up before moving on to the next stage
105 Drivers start with 4 points on their driving record and they receive an additional 2 points on the anniversary date of their first licence to a maximum of 10 points

---
<table>
<thead>
<tr>
<th>GDL Component</th>
<th>Licence Class</th>
<th>PROVINCE TERRITORY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BC</td>
<td>AB</td>
</tr>
<tr>
<td>Licence Class</td>
<td>7L</td>
<td>7</td>
</tr>
<tr>
<td>Suspensions</td>
<td>must restart program after violations(^{106})</td>
<td>after 8 points, suspension is given (^{107})</td>
</tr>
<tr>
<td>Driver Improvement Actions</td>
<td>voluntary</td>
<td>GDL improvement program</td>
</tr>
</tbody>
</table>

Source: Traffic Injury Research Foundation, Young and New Driver Resource Centre.
For more information on graduated licensing programs in Canada visit www.yndrc.tirf.ca.

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106 If licence is suspended, cancelled, or disqualified, the driver will be required to restart the GDL Novice stage; the time the GDL Novice licence has been held will not be counted toward the total time required to qualify to be eligible to obtain a full privilege Class 5 or Class 6 licence; when the Novice licence is reinstated, the driver must again meet the time requirement for the Novice stage and will not be eligible to progress out of the Novice stage for at least another 18 months

107 Violation of the zero BAC limit: 30-day licence suspension, violation of the night driving restrictions: Learner could be fined up to $115 and two demerit points, violation of the passenger restrictions: Learner will receive a $115 fine and two demerit points on their licence, violation of the Supervisory Driver conditions: Learner could be fined $230 and two demerit points

108 New: Immediate seizure and impoundment of the vehicle if the blood-alcohol level is above 160mg/100ml, or for a refusal to provide a breath or blood sample, a refusal to submit to physical coordination tests, or any other repeat offence Violation of the zero BAC limit: A new driver who consumes alcohol and drives will have their learner licence suspended; if an offence is committed, 90 days of immediate suspension...resulting in a licence revocation of at least 3 months

109 New drivers will be required to attend a Novice Driver Hearing with Driver Improvement and Control Section of Driver and Vehicle Licensing (see Drive Improvement Action section below for details); and may also be required to attend a Novice Driver Hearing as a result of convictions or accident involvement
### A.2.2  GDL New Drivers: Learner Stage (Stage 2) at a Glance

<table>
<thead>
<tr>
<th>GDL Component</th>
<th>BC</th>
<th>AB</th>
<th>SK</th>
<th>MB</th>
<th>ON</th>
<th>QC</th>
<th>NB</th>
<th>NS</th>
<th>PEI</th>
<th>NL</th>
<th>YK</th>
<th>NWT</th>
<th>NU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence Class</td>
<td>7N</td>
<td>5</td>
<td>5</td>
<td>5L</td>
<td>G2</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Age Restriction</td>
<td>Min Entry Age</td>
<td>17</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16 and 6 months</td>
<td>17</td>
<td>16 and 8 months</td>
<td>16</td>
<td>16 and 9 months</td>
<td>16 and 8 months</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Min Exit Age</td>
<td>18 and 6 months</td>
<td>18</td>
<td>16 and 6 months</td>
<td>17 and 6 months</td>
<td>17 and 8 months</td>
<td>19</td>
<td>18</td>
<td>17</td>
<td>17 and 8 months</td>
<td>17 and 6 months</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Entry Requirements</td>
<td>Time Completion</td>
<td>7L for 12 months</td>
<td>7 for 12 months</td>
<td>7 for 9 months</td>
<td>5L for 9 months</td>
<td>G1 for 8 to 12 months</td>
<td>5 for 24 months</td>
<td>7 (level 1) for 8 to 12 months</td>
<td>7 for 5 months</td>
<td>7 for 275 days to 12 months</td>
<td>5 (level I) for 8 to 12 months</td>
<td>7 for 6 months</td>
<td>7 for 12 months</td>
</tr>
<tr>
<td></td>
<td>Past test/course</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes (need 75% to pass)</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Parental Consent: Age Applied</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yes if under 18</td>
<td></td>
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<td>18 months</td>
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110 Held a Class 7 licence for 24 consecutive months without a driving prohibition - reduced by 6 months if an approved driver education course is successfully completed in the learner stage and drivers have no violations (tickets) or at-fault crashes (found to be 50% or more at fault) for the first 18 months of the Novice stage

111 Without suspension

112 16 months if driver has successfully completed driver training course and entered Level 2 after 8 months

113 Without suspension

114 6 hour Defensive Driving course or complete the full Driver Training Course (25 hours theory, 10 hours driving time)
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<tr>
<td>Maximum Holding Period</td>
<td>no limit (^{115})</td>
<td>indefinite</td>
<td>can be extended 200 days (^{116})</td>
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\(^{115}\) 5 year licence, can be renewed without re-qualifying/re-testing for licence

\(^{116}\) This period can be extended through driver improvement action; maximum extension is 200 days at a hearing; should there be subsequent hearings, a further extension can be imposed at each hearing (max of 200 days per hearing)
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<tr>
<th>GDL Component</th>
<th>PROVINCE TERRITORY</th>
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<td>Suspensions/Prohibitions</td>
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<td>Suspensions</td>
<td>over 4 points 120</td>
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</table>

117 Limited to number of working seatbelts, only one passenger can be a non-immediate family member, other passengers must be immediate family members
118 Only one non-family member as a passenger, the other passengers must be members of the Stage 2 driver’s immediate family
119 No Stage 2 driver shall use a hand-held cellular telephone, headphones, mp3 player or any other hand-held electronic device while operating or having care and control of a motor vehicle
120 If a driving prohibition is received, the driver goes back to the beginning of the novice stage after serving their prohibition time, losing all experience time
121 Violation of the zero BAC limit: 30-day licence suspension, violation of the night driving restrictions: Learner could be fined up to $115 and two demerit points, violation of the passenger restrictions:
122 Violation of the zero BAC limit: 24-hour roadside suspension, required to attend a Novice Driver hearing. If the driver’s BAC is over.08 BAC or they refuse to provide a breath sample, the existing drinking and driving countermeasures will apply. Violation of any GDL restrictions: Drivers will be required to attend a Novice Driver Hearing with Driver Improvement and Control Section of Driver and Vehicle Licensing (see Drive Improvement Action section below for details) for further sanctions. As a result of the hearing, they may receive: a licence suspension, an extension of the Learner or Intermediate Stage, special driving courses (at their own expense), passenger restrictions, time of day restrictions, or other driving restrictions
123 Violation of the passenger restrictions: Stage 2 drivers will be suspended for any seatbelt fines they receive: 30 days for 1st offence, and 90 days for 2nd offence; any suspension times will be added to the waiting period to exit Stage 2
## GDL New Drivers: Additional Novice Stages at a Glance

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<th>GDL Component</th>
<th>PROVINCE TERRITORY</th>
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<td>Past test/course</td>
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</table>

Source: Traffic Injury Research Foundation, Young and New Driver Resource Centre

124 Drivers in any stage who are found at fault for a collision, or who receive traffic convictions, will be placed in the Graduated Driver’s Licensing Improvement Program

125 Excluding interruptions (i.e. suspensions)
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<td>Road Restrictions</td>
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<td>Other Restrictions</td>
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<td>Suspensions/Prohibitions</td>
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<td>Lower Driver Penalty Point Threshold</td>
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<td>incident based 127</td>
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<td>9 or more points: suspension 128</td>
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<td>15 or more points: 1 month suspension</td>
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</tbody>
</table>

126 Stage 3 drivers are required to have a Graduated Decal displayed on any motor vehicle they operate; this is the same decal the driver received for Stage 2.
127 Based on the number of traffic violations/convictions and at-fault collisions. In the event of an incident, the Novice 2 driver will be required to restart the 12 month incident-free period again, and will be placed in the Graduated Driver Licensing Improvement Program.
128 An accumulation of 9 or more demerit points will result in the suspension of the Stage 3 Driver’s Licence, followed by a one-year probation period; if the driver receives any fines that carry demerit points during the probation period, the Stage 3 driver’s licence will be suspended.
<table>
<thead>
<tr>
<th>GDL Component</th>
<th>PROVINCE TERRITORY</th>
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<tbody>
<tr>
<td>Licence Class</td>
<td>BC</td>
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<td></td>
<td>5 (novice 2)</td>
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<tr>
<td>Suspensions</td>
<td>violations may lead to restarting 12 month stage</td>
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<tr>
<td>Driver Improvement Actions</td>
<td>GDL Improvement Program</td>
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</tbody>
</table>

Source: Traffic Injury Research Foundation, Young and New Driver Resource Centre

129 The 12 months in Novice 2 must be at fault collision, traffic conviction and licence suspension free
130 Violation of the zero BAC limit: 24-hour roadside suspension, required to attend a Novice Driver hearing. If the driver’s BAC is over.08 BAC or they refuse to provide a breath sample, the existing drinking and driving countermeasures will apply. Violation of any GDL restrictions: Drivers will be required to attend a Novice Driver Hearing with Driver Improvement and Control Section of Driver and Vehicle Licensing. As a result of the hearing, they may receive: a licence suspension, an extension of the Learner or Intermediate Stage, special driving courses (at their own expense), passenger restrictions, time of day restrictions, or other driving restrictions
131 Different interventions may apply for novice or experienced drivers, depending on how serious the unsafe driving was and how often it occurred. For novice drivers, the interventions begin earlier than experienced drivers. Interventions include: sending the driver a warning letter about their driving, requiring the driver to complete a driver course or requiring the driver to attend a Show Cause Hearing