

## Parental and young driver compliance with the conditions of graduated licensing: Findings from the New Zealand Drivers Study

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### Abstract

The effectiveness of graduated driver licensing (GDL) programmes to reduce crash risk is limited if the main components are not complied with. The aim of this paper was to examine factors associated with compliance with GDL conditions. This study was part of the New Zealand Drivers Study, a prospective cohort study of newly licensed car drivers, interviewed at learner, restricted and full licence stages of GDL. After the new drivers had gained a restricted licence, their parents were interviewed. They reported knowledge of, and support for, the GDL conditions, their enforcement of the learner licence condition, and the limits they intended to place on their adolescent's restricted licence stage driving. At the full licence interview, young drivers reported on vehicle ownership, driving experience, and compliance with the restricted licence conditions. 23% of restricted licence drivers reported regularly breaching GDL conditions, in terms of driving unsupervised with passengers and at night (10pm-5am). Multivariate logistic regression analysis indicated that adolescents were at increased odds of breaching these conditions if their parent reported low knowledge of conditions, allowed them to breach the learner licence supervisor condition, intended to place few limits on their driving, and if adolescents owned a vehicle as a restricted licensed driver. Parents would benefit from having a better understanding of the importance of their role, and the influence they have on their adolescent's driving. Supporting GDL conditions is not enough; parents need to enforce compliance, place limits on their adolescent's driving and limit vehicle ownership.

### Introduction

Graduated Driver Licensing Systems (GDL) are designed to limit novice drivers' exposure to high risk driving situations, such as night-time driving, carrying young passengers and driving after drinking alcohol, while allowing them to gain the experience they need under the supervision of an experienced driver (Ministry of Transport 1985; Waller 2003). The key elements of graduated licensing are a learner licence period of supervised driving, with supervision normally provided by parents. This is followed by a restricted licence period that allows unsupervised driving under certain low risk conditions. Under the requirements of a restricted licence in New Zealand there are two main driving conditions. Restricted licence drivers are required to have a supervisor with them if they drive between 10pm and 5am (night-time condition) or if they drive with passengers (passenger condition).

Crash risk is at its highest during the restricted (provisional) licence stage of GDL, as novice drivers transition from supervised to independent driving (Mayhew, Simpson & Pak 2003; McCartt, Shabanova & Leaf 2003; Lewis-Evans 2010). For the restricted licence stage to work as intended, restricted drivers need to comply with the conditions of their licence as breaching the conditions has been shown to contribute to an elevated crash risk (Carpenter & Pressley 2013; Williams 2003). Increasing compliance with GDL conditions has been identified as a potential mechanism to improve safety during this high risk period, with parents playing a crucial role (Williams, Tefft & Grabowski 2012). The aim of this paper was to examine factors associated with compliance with GDL conditions.

## Method

### *Study Context*

This research was part the New Zealand Drivers Study (NZDS), a prospective cohort study of 3992 newly licensed car drivers (Begg, Langley, Broughton, Brookland, Ameratunga & McDowell 2009; Langley, Begg, Brookland, Ameratunga, McDowell & Broughton 2012; Langley, Begg, Brookland, Samaranyaka, Jordan & Davie 2012). The NZDS cohort was recruited between 1<sup>st</sup> February 2006 and 31<sup>st</sup> January, 2008 from driver licensing agencies and licensing courses throughout New Zealand, when potential participants passed their car learner licence theory test (Class 1L Licence). At this stage participants completed a self-administered baseline questionnaire. The follow-up telephone interviews were aligned with the licensing stages of the GDL, with the first taking place at the restricted licence stage (Class 1R licence/provisional licence) and the second at the full licence stage (Class 1F licence). After full licensure, on-going follow-up continues through national databases that monitor motor vehicle related crashes, infringements, convictions and hospitalisations.

### *Parent recruitment*

Parents of NZDS young drivers were invited to participate in a parent interview if their adolescent: 1). was aged 15 - 17 years at the learner licence stage and 2). passed their restricted licence test by 1<sup>st</sup> August, 2008 and 3). completed the NZDS restricted licence stage follow-up interview. Contact details for parents were obtained from all eligible young drivers at the end of their interview. Initial contact with parents was made by a personal letter to the parent informing them about the study, and inviting their participation. This letter was followed by a computer assisted telephone interview for those parents who agreed to participate. In situations where two parents were available to be interviewed the parent whom the young driver deemed their main supervisor was the first preference. If this parent refused then the second parent was invited to take part. To help ensure confidentiality for both parents and young drivers, their respective interviews were conducted by different trained interviewers.

In total, 1435 young drivers met the eligibility criteria and 1200 parents (84%) participated in the parent telephone interview. Of the 1200 adolescents whose parent participated, 922 passed their full licence by January 2011, and 895 (97% of 922: 75% of 1200) completed their full licence stage follow-up interview. These 895 adolescents and their parent are the participants included in this study.

### *Outcome Variable: GDL breaches during restricted licence stage*

The outcome of interest in this study was regularly breaching the GDL conditions during the restricted licence stage. The outcome was created from the adolescent reports of breaching the GDL restricted licence conditions, from their full licence stage interview. Firstly, adolescents reported if they drove at night (between 10pm and 5am). The adolescents who had driven at night reported the proportion of their driving at night (between 10pm and 5am) that happened without a supervisor present. Response options were 'none of it', 'less than half of it', 'half of it', 'mostly all of it' or 'all of it'. Similarly, adolescents who reported driving with passengers reported the proportion of their driving with passengers that happened without a supervisor present. Response options were 'none of it', 'less than half of it', 'half of it', 'mostly all of it' or 'all of it'. Adolescents who responded with 'mostly all of it' or 'all of it' for both conditions (night-time and passenger) were classified as regularly breaching the GDL conditions.

## ***Explanatory Variables***

### ***Parent knowledge and support of GDL conditions***

#### ***Knowledge of GDL Conditions***

Learner licence supervisor condition: Parent knowledge of the supervisor condition was assessed by asking “For a driver with a learner licence there is one main driving restriction. Can you tell me what this restriction is?” Responses which stated that a supervisor was required at all times were coded as correct (scored as 0), other responses were coded as incorrect (score=1). Restricted licence conditions: To measure their knowledge of the restricted licence stage conditions, parents were asked: “A driver with a restricted licence has certain driving restrictions. Can you tell me what these restrictions are?” Parents were prompted “Can you think of any other restriction?” to allow them the opportunity to recall all they knew about the conditions. The coding of responses was as follows: Night-time condition knowledge: Responses relating to the night-time condition were coded as ‘full knowledge’ if parents reported (1) no driving between 10pm and 5am and (2) unless supervised (correct, score=0). Reporting only one of these components was coded ‘partial knowledge’ (score=1) and other responses were coded as incorrect (score=2). Passenger condition knowledge: Responses relating to the passenger condition were coded as ‘full knowledge’ if parents reported (1) no driving with passengers and (2) unless supervised (correct, score=0). Reporting only one of these components was coded ‘partial knowledge’ (score=1) and other responses were coded as incorrect (score=2).

The scores of the three knowledge questions were combined to create one composite variable ‘knowledge of GDL conditions’. The possible total score ranged from 0 (full correct knowledge) to 5 (no knowledge). As very few parents had full correct knowledge, scores of 0 and 1 were combined to represent ‘high knowledge’ and the remaining scores were combined to represent ‘low knowledge’.

#### ***Support for GDL Conditions***

Support for conditions: Regardless of their knowledge of the conditions, parents were given the details of each condition and asked “how much do you 1. agree or disagree that a learner driver should have a supervisor in the car at all times? 2. agree or disagree with the night-time driving restriction? and 3. agree or disagree with the passenger restriction?”. Response options ranged on a four point Likert scale from ‘strongly agree’ to ‘strongly disagree’. Support for GDL conditions was measured by one composite variable, created from the three support questions. Responses of ‘strongly agree/agree’ to all three questions were coded as ‘support conditions’, other responses coded as ‘do not support all conditions’.

### ***Parent management of adolescent driving***

#### ***Allow unsupervised driving during Learners***

Parents were asked about the driving their adolescent had done without supervision on their learner licence, thereby driving contrary to the conditions of the licence. Parents who reported that their adolescent had driven without supervision were asked how often they allowed their adolescent to drive unsupervised. Responses were coded as ‘never allowed’ or ‘allowed’ unsupervised driving (responses of ‘once’, ‘a few times’ and ‘many times’).

#### ***Driving Rules***

Parents reported on the driving rules they intended to use while their adolescent was on their restricted licence. Parents responded either ‘yes’ or ‘no’ to intending to use the following eight rules during the restricted licence stage: no driving with passengers without a supervisor; no driving

between 10pm - 5am without a supervisor; only allowed to drive when parents agree with purpose of the trip; limit on the number of teenage friends that can be in the car; no driving unless wearing a seatbelt; only allowed to take car to certain places; no drinking and driving; only allowed to drive certain routes (e.g., no driving on the open road, 100 kph areas). A summary measure of driving rules intended was created. If a parent intended to enforce a rule (response 'yes') it was scored as '0'; not intending to enforce a rule (response 'no') was scored as '1'. The possible score ranged from 0 (high management; all rules intended to be enforced) to 8 (low management; no rules intended to be enforced). From this scores were categorised; 'all rules' (score 0: all rules intended to be enforced), 'most rules' (score 1, 2: one or two rules not intended to be enforced), 'few rules' (scores  $\geq 3$ : at least three rules not intended to be enforced).

### *Vehicle ownership*

In their full licence interview adolescents reported the details of the vehicle they drove the most while on their restricted licence and whom the vehicle belonged to. Responses were categorised as 'adolescent owner of vehicle [driven during restricted licence stage]' or 'adolescent non-owner'.

### ***Potential Confounding Variables***

Several potential confounding variables were included in the analysis.

#### ***Demographic characteristics and driving exposure***

*Gender and Age:* Parent gender, adolescent gender and age at restricted licence were included in the model. Adolescent age when they obtained their restricted licence was obtained from their official driver licence records. The age categories were 15 years, 16 years, and 17 years or older.

#### *Driving exposure*

##### *i) Length of time held restricted licence*

To account for variable length of follow-up, the number of months an adolescent held a restricted licence was calculated from the official driver licence records. This was treated as a continuous variable in the analysis.

##### *ii) Estimated distance driven on restricted licence*

As crash risk and opportunity to engage in risky driving behaviour increase with increased driving it was important to control for driving exposure in the analysis. Total estimated distance driven on restricted licence was calculated from the driving exposure questions from the full licence interview. Adolescents were asked a series of questions to obtain an estimate the number of kilometres driven on-road, as a restricted licence driver (Lajunen & Özkan 2011). Information was gathered on their driving with or without a supervisor present and also any driving with a professional instructor and has been described elsewhere (Gulliver, Begg, Brookland, Ameratunga & Langley 2013). The total estimated distances driven with or without a supervisor and with a professional instructor were summed to create the total distance driven. As this estimate was based on recall and will be open to measurement error, especially at the extremes, the *total distance driven* was classified into three categories to identify those with low exposure and those with high exposure. The categories were low (lowest quartile), medium (middle quartiles) and high (highest quartile).

### ***Statistical Procedures***

All analyses were undertaken using SAS (9.2). In the preliminary analysis stage unadjusted odds ratios were calculated using logistic regression to examine the magnitude of association between each explanatory variable and the outcome, and to determine which explanatory variables to retain

in the multivariate model. Adjusted logistic regression analysis was conducted to determine the independent association between the explanatory variables with the outcome. The threshold for including explanatory variables in the multivariate models was set at  $p < 0.20$ , to ensure no potentially important variables were removed too soon (Hosmer & Lemeshow 2004). Based on prior research, parent gender, and the following adolescent variables: gender, age at restricted licensure, and driving exposure were considered important variables to retain in the models, so were “forced” into the multivariate model (regardless of their p-value in the univariate analysis). The number of months on restricted licence was included in the model to adjust for the variable length of follow-up. The Hosmer and Lemeshow goodness of fit statistic and the area under the ROC (Receiver Operating Characteristic) curve were assessed to determine the adequacy of fit for the final model.

## Results

Table 1 displays the proportion of adolescents who reported breaching the conditions of their restricted licence, and the proportion of their driving that was in breach of the conditions. Almost two-thirds of young drivers reported driving at night (10pm-5am) without supervision. The frequency of driving at night unsupervised was high, with 53% of these adolescents reporting that ‘mostly all’ or ‘all’ of their night-time driving was unsupervised. Eighty-one percent of adolescents reported driving with passengers without supervision. This was also a frequent behaviour, with 43% of these adolescents reporting that ‘mostly’ or ‘all’ of their driving with passengers was without supervision.

Twenty three percent of adolescents reported that ‘mostly all’ or ‘all’ of their night-time driving and their driving with passengers was unsupervised and these young drivers were classified as having regularly breached both GDL conditions.

Table 2 displays the unadjusted and adjusted logistic regression results for the odds of regularly breaching both GDL restricted licence stage conditions. In the unadjusted analysis parent knowledge, driving rules, unsupervised driving and adolescent vehicle ownership were all associated with adolescents regularly breaching the restricted licence night-time and passenger conditions. Level of parental support for the conditions was not associated with adolescent compliance. After adjusting for parent and adolescent gender, adolescent age at licensure, driving exposure and months licensed, the following factors remained independently associated with adolescents having increased odds of regularly breaching both conditions: Adolescents whose parents had low knowledge of GDL conditions, intended to use few driving rules (five or less), allowed unsupervised driving during the learner stage and adolescents who owned the vehicle they drove had higher odds of regularly breaching the GDL conditions. The fit of the model was acceptable, Hosmer and Lemeshow fit statistic ( $p=0.59$ ), and area under the ROC curve 68%.

**Table 1. Adolescent report of compliance with the restricted licence stage GDL conditions**

	N	%
<b>Ever drove at night between 10pm - 5am (with or without supervision)?</b>		
<i>Never drove at night</i>	115	(13)
<i>Never drove unsupervised at night</i>	197	(22)
<i>Drove unsupervised at night</i>	<u>581</u>	(65)
	893	
 <b>Adolescents who drove unsupervised at night (10pm-5am) were asked: How much of your night-time driving was without a supervisor?</b>		
<i>Less than half of it</i>	197	(34)
<i>Half of it</i>	80	(14)
<i>Mostly all of it</i>	179	(31)
<i>All of it</i>	<u>125</u>	(22)
	581	
 <b>Ever drove with passengers (with or without supervision)?</b>		
<i>Never drove with passengers</i>	4	(0)
<i>Never drove with passengers unsupervised</i>	167	(19)
<i>Drove with passengers unsupervised</i>	<u>724</u>	(81)
	895	
 <b>Adolescents who drove with passengers unsupervised were asked: How much of your driving with passengers was without a supervisor?</b>		
<i>Less than half of it</i>	283	(39)
<i>Half of it</i>	125	(17)
<i>Mostly all of it</i>	270	(37)
<i>All of it</i>	<u>46</u>	(6)
	724	

**Table 2. Unadjusted and adjusted logistic regression for odds (odds ratios and 95% confidence intervals) of regularly breaching both GDL Restricted Licence stage conditions**

<b>Regularly breaching both GDL Restricted Licence stage conditions</b>						
	Unadjusted			Adjusted (N=890)		
	OR	95% CI	P-value	OR	95% CI	P-value
<b>Parent GDL Knowledge and Support</b>						
<i>Knowledge of GDL Conditions</i>						
High	1.00			1.00		
Low	1.75	(1.2-2.4)	<0.01	1.77	(1.2-2.5)	<0.01
<i>Support for GDL Conditions</i>						
Agree with all conditions	1.00					
Do not agree with all conditions	1.21	(0.8-1.8)	0.36			
<b>Parent Management</b>						
<i>Allowed unsupervised driver during Learner Licence stage</i>						
No	1.00			1.00		
Yes	2.21	(1.3-3.8)	<0.01	2.24	(1.3-3.9)	<0.01
<i>Driving rules intended during Restricted Licence stage</i>						
All rules	1.00			1.00		
Some rules	1.10	(0.8-1.6)	0.61	1.08	(0.8-1.6)	0.68
Fewer rules	2.50	(1.6-3.9)	<0.01	2.17	(1.4-3.5)	<0.01
<i>Adolescent owned vehicle Restricted Licence stage</i>						
No	1.00			1.00		
Yes	1.82	(1.3-2.5)	<0.01	1.50	(1.1-2.1)	0.02
<b>Potential Confounding Factors</b>						
<i>Parent Gender</i>						
Female	1.00			1.00		
Male	1.03	(0.7-1.4)	0.86	1.02	(0.7-1.4)	0.92
<i>Adolescent Gender</i>						
Female	1.00			1.00		
Male	1.27	(0.9-1.8)	0.15	1.21	(0.9-1.7)	0.27
<i>Age at Restricted Licence</i>						
15 years	1.00			1.00		
16 years	1.70	(1.2-2.4)	<0.01	1.76	(1.2-2.5)	<0.01
17 years and older	1.09	(0.7-1.7)	0.73	0.93	(0.6-1.6)	0.78
<i>Estimated km driven on Restricted Licence</i>						
Low	1.00			1.00		
Moderate	1.21	(0.8-1.8)	0.35	1.05	(0.7-1.6)	0.83
High	2.22	(1.4-3.4)	<0.01	1.87	(1.1-3.0)	0.01
<i>Months on Restricted Licence</i>						
	1.00	(1.0-1.0)	0.75	0.98	(0.9-1.0)	0.15

## **Discussion**

The aim of this paper was to examine factors associated with adolescent compliance with GDL conditions.

The effectiveness of graduated driver licensing (GDL) programmes to reduce crash risk is limited if the main components are not complied with. In this study breaching the restricted licence conditions was very common. Almost two-thirds of adolescents had driven unsupervised at night, over 80% had driven unsupervised with passengers while on their restricted licence and 62% breached both conditions. Perhaps of even greater concern was how frequently the breaches occurred. Almost one quarter of adolescents reported regularly breaching both the night time and the passenger condition.

Multivariate analysis results indicated that several parental factors were associated with adolescents regularly breaching the conditions of GDL. Low knowledge of the GDL conditions, allowing their adolescent to breach the learner licence supervisor condition, intending to enforce fewer limits on their adolescent's restricted licence stage driving and allowing their adolescent to own a vehicle were all independently associated with low compliance. These factors are all potentially modifiable through programme and policy initiatives to educate parents.

This research had a number of strengths. One of the main strengths was the prospective cohort study design. This ensured temporality as the explanatory factors were measured before the outcomes had occurred. A further strength was the high recruitment and follow-up rates for young drivers and parents. The research also has some limitations. Firstly, a potential limitation is the reliance on self-reported data and the potential problem of social desirability bias. Loss to follow-up bias is another potential problem. To be included in the study young drivers needed to progress from their restricted licence to their full licence within the study follow-up period. A comparison of those followed with those who did not progress indicated that non-progressors were more likely to be female, older at restricted licensure and to have breached their learner licence supervisor condition. Their parents were more likely to have lower knowledge of the GDL conditions, be less supportive of the conditions, and intended to place fewer rules on their adolescents driving. The overall effect of the limited follow-up period on the results is difficult to determine. The most likely effect would be an underestimation of the magnitude of associations found for the compliance outcome.

## **Conclusion**

Internationally there has been an upsurge in programmes for parents of young drivers to increase parental involvement in adolescent driving. The findings from this research reinforce the important role parents have to play. In particular it has identified specific issues that warrant attention to encourage parents to more actively ensure their adolescent complies with the conditions of their licence. Parents would benefit from having a better understanding of the importance of their role, and the influence they can have on their adolescent's driving. Supporting GDL conditions is not enough; parents need to enforce compliance, place limits on their adolescent's driving and limit vehicle ownership during the restricted licence stage to allow their young driver the opportunity to learn to drive independently in a low risk environment.

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