

Is it time to revisit the problem young driver?

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Abstract

For decades there have been two young driver concepts: the ‘young driver problem’ where the driver cohort represents a key problem for road safety; and the ‘problem young driver’ where a sub-sample of drivers represents the greatest road safety problem. Given difficulties associated with identifying and then modifying the behaviour of the latter group, broad countermeasures such as graduated driver licensing (GDL) have generally been relied upon to address the young driver problem. GDL evaluations reveal general road safety benefits for young drivers, yet they continue to be overrepresented in fatality and injury statistics. Therefore it is timely for researchers revisit the problem young driver concept to assess its potential countermeasure implications. Personal characteristics, behaviours and attitudes of 378 Queensland novice drivers aged 17-25 years were explored during their pre-, Learner and Provisional 1 (intermediate) licence as part of a larger longitudinal research project. Self-reported risky driving was measured by the Behaviour of Young Novice Drivers Scale (BYNDS), and five subscale scores were used to cluster the drivers into three groups (high risk $n = 49$, medium risk $n = 163$, low risk $n = 166$). High risk ‘problem young’ drivers were characterised by self-reported pre-Licence driving, unsupervised Learner driving, and speeding, driving errors, risky driving exposure, crash involvement, and offence detection during the Provisional period. Medium risk drivers were also characterised by more risky road use behaviours than the low risk group. Interestingly problem young drivers appear to have some insight into their high-risk driving, and they report significantly greater intentions to bend road rules in future driving. The results suggest that in addition to broad countermeasures such as GDL which target the young driver problem, tailored intervention efforts may need to target problem young drivers. Driving behaviours and crash-involvement could be used to identify these drivers as pre-intervention screening measures.

Keywords: Young driver; novice; problem young driver; graduated driver licensing; cluster

1. Introduction

Two conceptualisations of the young driver and their crash risks can be found in the extant road safety literature: the ‘young driver problem’ and the ‘problem young driver’. The ‘young driver problem’ concept recognises the problematic road safety of the entire cohort of young drivers as evidenced by their overrepresentation in road crashes and the fatalities and injuries arising from these crashes. To illustrate in Queensland, Australia, 23% of all persons fatally injured in car crashes were aged 17-24 years (Department of Transport and Main Roads (DTMR), 2011). In comparison, the concept of the ‘problem young driver’ assumes that a sub-sample of the young drivers, rather than the young driver population generally, presents the greatest road safety challenge, and this is suggested to be through their deliberate engagement in risky driving behaviour (Senserrick, 2006). To demonstrate, 2.5% of young novice drivers in South Australia between July 1998 and June 2001 had been detected for a speeding offence during the first six months of driving with a Provisional license, and their speeding offences were found to predict future speeding offences and future road crashes (Kloeden, 2008).

Reliably identifying ‘problem young drivers’ has to date proved to be a challenging task for researchers for a variety of reasons, including the lack of an operational definition and membership-criterion (e.g., single- vs. multiple-crash involved) and high rates of false-positives (incorrectly classified as high risk) in analyses (Crettenden & Drummond, 1994). Notwithstanding these limitations, some gender-related patterns have emerged such that males appear over-represented in the most high risk driver groups. In addition, sensation seeking propensity (Arnett, 1990), and psychological distress including anxiety and depression (Scott-Parker, Watson, King & Hyde 2011), have been found to be associated with more on-road risky driving behaviour.

Some research has examined the personal characteristics of the general young driver population in attempt to identify problem young drivers. For example, Ulleberg (2002) considered the sensation seeking propensity, trait aggression, anxiety, altruism, and normlessness of 2498 drivers aged 18-23 years who had held a licence for at least 3 months. The young drivers also completed seven items from the Driving Anger Scale and self-reported their crash involvement. Six clusters of drivers were identified according to their combination of personal traits; however only five groups could be clearly identified, including two high- and three low-risk groups. One high risk group comprised 80.9% males, the other 41.1% males, compared to the two low risk groups which consisted of 15.6% and 57.6% male drivers. A greater proportion of drivers in the two high-risk clusters (approximately 31.7% of the sample) reported crash involvement and more risky driving behaviours such as speeding. In addition, Wundersitz (2007) examined the characteristics of 270 university undergraduate psychology students aged 17-21 years who held a Provisional drivers’ licence and identified four clusters according to personality, hostility and aggression, and driving-related aggression, which included one low-risk, and one high-risk cluster. The high-risk cluster reported more detected offences and more crash involvement, and greater sensation seeking than the low risk cluster.

Other research has examined the self-reported risky driving behaviours of drivers. For example, a longitudinal sample of 1135 Victorian drivers aged 19-20 years who had held a Learner or Provisional licence for an average of nearly 21 months were grouped into three clusters of increasing risk according to their engagement in such behaviours as speeding by up to 10 kilometres per hour (km/hr), driving whilst tired, and not wearing seatbelts (Vassallo et al., 2007). The low risk group comprised nearly two thirds of the sample and 39% were male; the high risk group comprised 7% of the sample and were 77% male. The high risk group also reported significantly more speeding violations and crash involvement than the low risk group, confirmed through official Police records (Vassallo et al., 2008).

Further research has explored the driving style preferred by young drivers. The driving styles (as measured by the Multi-Dimensional Driving Style Inventory) of 312 drivers was examined by Kleien (2011). The drivers from the Australian Capital Territory were aged 18-25 years (161 held a Provisional licence) with an average of 3.2 years driving experience. The drivers were clustered into three internally-consistent styles: reckless, anxious, and patient/careful, with males scoring more highly on the reckless style and females scoring more highly on the anxious and patient/careful styles. The relationship between the three driving styles, crashes and offences was not considered, however.

In summary, thus far in the literature there is consensus that a problem young driver population exists; however there is no consensus regarding the specific characteristics – sociodemographic, attitudinal, behavioural or other – identifying the problem young driver. This lack of consensus may have contributed to the limited attention to the consideration, development, implementation and evaluation of countermeasures specifically targeting this risky subgroup. In contrast, the young driver problem is readily recognised. Difficulties associated with identifying the sub-group comprising problem young drivers, in addition to

the heightened risk experienced by all young drivers, have led to the introduction and refinement of broad countermeasures such as graduated driver licensing (GDL) programs. As such, the GDL program in Queensland, Australia, was considerably enhanced in July 2007. Key changes include a longer Learner period (increased from 6 to 12 months, Learner age decreased from 16.5 years to 16 years) with a minimum of 100 hours of supervised driving practice (minimum of 10 at night) recorded in a logbook. Learners must be supervised at all times. After passing the practical driving assessment, Learners progress to a Provisional 1 (P1) (intermediate) licence which must be held for a minimum of 12 months (Queensland Transport, 2007).

GDL evaluations reveal that the most restrictive programs correspond to the greatest road safety benefits, for the youngest novice drivers in particular (Masten, Foss, & Marshall, 2011). It is noteworthy, however, that young drivers continue to be overrepresented in the road crash, injury and fatality statistics, suggesting that interventions targeting particular groups of young novice drivers may be required in addition to broad countermeasures such as GDL. Some way of reliably identifying these groups is required, and recent research conducted by the authors (e.g., Scott-Parker et al., 2011, 2012a, 2012b, in press a, in press b) and others (e.g., characteristics of young novices who report driving on the road before licensure: Begg, Sullman, Brookland, Langley, Ameratunga, & Broughton, 2010; Senserrick, Chen, Boufous, Ivers, Stevenson, & Norton, 2010) have undertaken is promising in this regard. Therefore it is timely that the concept of the problem young driver be revisited. Of particular interest is establishing what personal characteristics, attitudes and/or behaviours, if any, could be used effectively to identify problem young drivers. Determining such indicators could be helpful also in designing interventions which may need to target the young problem driver if further advances in reducing the burden of young driver crashes are to be made.

1.1 Study aims

A considerable stumbling block to addressing the problem young driver has been *how* to best identify them. The research clustered drivers into three groups of differing crash (and by extension differing crash risk) according to their self-reported driving behaviours, then examined their personal and driving characteristics according to these groupings. Therefore the study aims to identify problem young drivers by exploring their self-reported driving behaviours and attitudes, and their personal characteristics.

2. Method

2.1 Participants

Drivers aged 17-25 years ($n = 1170$, 709 females, $M = 17.90$ years, $SD = 1.51$) completed a first survey when they progressed to a Provisional 1 (P1) licence. Drivers from the same sample ($n = 378$, 265 females, $M = 18.22$ years, $SD = 1.59$) completed a second survey six months later. The analyses and results pertain only to the novice drivers who completed both surveys.

2.2 Design and procedure

Every driver in Queensland, Australia, who progressed from a Learner to a P1 licence in the period April through June 2010 was invited to participate in a larger longitudinal research project via a Flyer handed to them when they attended the government licensing agency. The first survey, the Learner Survey, explored pre-Licence and Learner GDL and driving experiences, including self-reported pre-Licence and unsupervised Learner driving (*yes, no*), and logbook accuracy (*accurate, rounding up/extra hours included*). Six months later participants who completed the Learner Survey were invited to complete the Provisional Survey exploring P1 driving experiences (e.g., talking themselves out of a ticket, *yes, no*) and

attitudes (e.g., dangerousness of bending¹ road rules 1 *very dangerous*, 5 *not at all dangerous*, driving intentions to bend/ likelihood of bending road rules 1 *very unlikely/ definitely will not/ very unwilling*, 7 *very likely/ definitely will/ very willing*; how safe/risky they were as a P1 driver, 1 *not very safe/ never risky*, 7 *very safe/ always risky*); and willingness to speed via four items (stick to the speed limit – go a lot faster, 1 = *very unwilling*, 7 = *very willing*).

Both surveys explored self-reported driving behaviour using the Behaviour of Young Novice Drivers Scale (BYNDS, Scott-Parker et al., 2010) (1 *never*, 5 *nearly all the time*) comprising five subscales and a speeding subscale extracted from the *transient violations* subscale (Scott-Parker et al., in press a, in press b); and self-reported crash and offence involvement (*yes, no*). Personal characteristics were also explored in both surveys, including their employment status (*full-time, part-time/not employed*), anxiety and depression using Kessler's Psychological Distress Scale (K10, Kessler & Mroczek, 1994, cited in Andrews & Slade, 2001) (1 *none of the time*, 5 *all of the time*), reward sensitivity using an abridged sensitivity to reward questionnaire (Scott-Parker et al., in press b) (*yes, no*), and sensation seeking propensity via the 8-item Brief Sensation Seeking Scale (BSSS, Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002) (1 *strongly disagree*, 5 *strongly agree*).

2.3 Statistical analyses

Cluster analysis of the five BYNDS subscale scores was undertaken via a two-step clustering technique using the Euclidean distance and Schwartz's Bayesian Criterion, designed to minimise the within-cluster variance whilst maximising the between-cluster variance. A proposed five-cluster solution was examined for meaningfulness, and examination of alternative two-, three-, and four- cluster solutions resulted in the selection of a three-cluster solution. Statistical analyses included Pearson's chi-square test, and means were compared via analysis of variance, the Kruskal-Wallis test, and the Wilcoxon-signed rank test, evaluated at significance $\alpha = .05$. Missing data was not imputed; rather cases were excluded in each analysis. Online surveys were administered via KeySurvey Enterprise Software. Analyses were conducted via PASW 18.

3. Results

Three clusters of drivers were identified using the self-reported BYNDS subscale scores as P1 drivers (Table 1). Sociodemographic, Learner and P1 driving behaviours and attitudes were then examined according to the three clusters. Cluster One contained 13% of the participants and comprised the most risky drivers (highest-risk), potentially the 'problem young drivers'. Clusters Two (medium-risk) and Three (lowest-risk) each contained 43% of the sample. Whilst there were only modest, non-significant differences in gender composition between clusters, the highest-risk group contained a significantly larger proportion of younger drivers (proportion of 17-year old drivers: highest-risk: 53.1%; medium-risk: 39.9%, lowest-risk: 39.8%, $p < .001$). Approximately twice the proportion of the highest-risk drivers as the lowest-risk drivers were employed full-time, which may have facilitated their somewhat greater car ownership rates. The highest-risk drivers also reported significantly

¹ Pilot research (preliminary small group interviews, unpublished, which informed the research of Scott-Parker et al., 2009) which explored young novice drivers' meanings regarding not following road rules, found that young novice drivers reported that they frequently 'bent the road rules' (e.g. driving at 5 km/hr above the posted speed limit). . Therefore to ensure that the young novice drivers in the present research responded to items regarding *all* transgressions of the road rules, the term 'bending the road rules' operationalised as "any time you did not follow the road rules completely, and includes things like going over the speed limit by any amount or reading a text on your mobile while you are driving".

greater anxiety and depression, reward sensitivity and sensation seeking propensity than the other two driver groups, particularly when compared to the lowest-risk group

The highest-risk group exhibited significantly greater involvement in risky driving, not only as pre-Licence drivers but also as unsupervised Learners; and 55.6% of the highest-risk drivers reported both pre-Licence driving and unsupervised Learner driving, compared to 30.4% ($p < .05$) of the medium-risk group and 20.0% ($p = .20$) of the lowest-risk group. Unsupervised driving in particular may also have contributed to the highest-risk drivers' reports of significantly less accurate logbooks. The highest-risk group also reported significantly more 'extra hours' had been added to their logbooks (highest-risk: 12.2%; medium-risk: 5.5%, lowest-risk: 1.8%, $p < .001$).

Table 1: Self-reported personal characteristics and driving behaviours in the pre-Licence, Learner and Provisional phases

Self-reported behaviours/ characteristics	Cluster (Risk level)			Significance p
	One (High) $n = 49$	Two (Medium) $n = 163$	Three (Low) $n = 166$	
<i>Personal characteristics</i>				
Gender (Male) ^{1,2}	34.7%	29.4%	28.9%	= .73
Age (M , (SD)) ¹	17.5 (1.1)	17.8 (1.4)	18.1 (1.6)	< .05
Studying (Full-time) ²	49.0%	51.5%	50.6%	= .50
Employed (Full-time) ²	26.5%	14.7%	13.3%	< .01
Car owner ²	85.7%	81.6%	76.5%	= .29
Reside in urban area ²	65.3%	66.7%	57.0%	= .17
Anxiety (M , (SD)) ²	8.4 (2.8)	7.1 (2.6)	6.5 (2.5)	< .001
Depression (M , (SD)) ²	12.8 (5.0)	10.2 (4.2)	9.8 (4.2)	< .001
Reward sensitivity (M , (SD)) ²	5.3 (2.6)	3.9 (2.2)	2.4 (2.0)	< .001
Sensation seeking (M , (SD)) ²	25.1 (6.3)	23.5 (6.1)	19.4 (5.9)	< .001
<i>Driving behaviours: pre-Licence and Learner phase</i> ¹				
Pre-Licence driving	22.4%	13.5%	8.4%	< .05
Inaccurate logbook	36.7%	20.9%	9.0%	< .001
Unsupervised driving	18.4%	14.1%	6.0%	< .05
Crashed car	10.2%	1.8%	3.0%	< .05
Offence detected	2.0%	3.7%	1.8%	= .55
BYNDS composite	78.3 (13.0)	71.7 (8.7)	65.6 (6.9)	< .001
Transient violations	23.9 (6.0)	20.8 (4.7)	17.8 (3.2)	< .001
Fixed violations	10.6 (1.1)	10.4 (0.9)	10.1 (0.5)	< .001
Misjudgement	15.0 (3.6)	13.4 (3.0)	12.4 (2.6)	< .001
Risky driving exposure	22.6 (4.8)	22.2 (3.8)	21.1 (3.2)	< .001
Driver mood	6.1 (2.7)	4.9 (2.0)	4.2 (1.5)	< .001
Speeding subscale	11.3 (4.0)	9.4 (2.9)	7.7 (1.7)	< .001
<i>Driving behaviours: Provisional 1 phase</i> ²				
Crashed car	26.5%	11.1%	3.0%	< .001
Offence detected	28.6%	12.9%	5.4%	< .001
Talk out of ticket	16.3%	2.5%	1.8%	< .001
BYNDS composite	103.7 (11.9)	79.7 (6.7)	63.9 (6.2)	< .001
Transient violations	34.4 (8.0)	24.0 (5.5)	17.6 (2.9)	< .001
Fixed violations	12.9 (4.0)	10.4 (0.8)	10.1 (0.4)	< .001
Misjudgement	16.4 (3.6)	12.8 (2.2)	10.4 (1.3)	< .001
Risky driving exposure	31.4 (4.3)	26.7 (3.8)	21.8 (4.0)	< .001
Driver mood	8.7 (2.3)	5.7 (2.0)	3.9 (1.2)	< .001
Speeding subscale	16.5 (4.6)	11.3 (3.6)	8.0 (1.9)	< .001

¹ Responses collected in Learner Survey (survey one examining pre-Licence and Learner period)

² Responses collected in Provisional Survey (survey two examining first six months of P1 period)

Differences in driving behaviours according to the BYNDS are also evident during the Learner period. Whilst there were modest differences in the self-reported fixed violations and risky driving exposure, there were considerable differences between the three groups of drivers according to transient violations including speeding in particular, misjudgement, and driving in response to mood, with the highest-risk drivers reporting considerably more risky behaviours than the two remaining clusters and the lowest-risk group in particular. Such over-involvement in risk driving behaviour is further reflected in the substantially higher crash involvement reported by the highest-risk drivers during the Learner period.

Over-involvement in crashes by the highest-risk drivers appeared to continue through the first six months of the P1 period. A substantially larger proportion of the highest-risk drivers also reported being detected for an offence in this time, and engaged in punishment avoidance by actively talking themselves out of a ticket after detection. The pattern of self-reported risky driving behaviour for each group of novice drivers persisted from the Learner period through the first six months of the P1 period; and in general the highest-risk drivers reported engaging in more risky driving behaviours at greater rates than the other two groups.

The P1 BYNDS scores were significantly higher than the Learner scores for the highest-risk group of novice drivers, confirming their driving behaviour became significantly more risky when they were able to drive independently ($p < .001$ for all scales except for misjudgement: $p < .05$). For the medium-risk group, self-reported driving behaviours also became more risky upon independent licensure ($p < .001$ for all scales), except for fixed violations which remained relatively stable ($p = .45$) and misjudgement, which decreased slightly ($p < .05$). For the lowest-risk group, involvement in speeding increased slightly ($p < .05$), transient and fixed violations, and risky driving exposure remained relatively constant ($p = .48$, $p = .45$, $p < .05$ respectively) whilst driving in response to their mood, misjudgement, and the composite score decreased significantly between license periods ($p < .05$, $p < .001$, $p = < .01$ respectively), in stark contrast to the highest-risk group.

The 44 items comprising the BYNDS were also examined for each group in the P1 period, and as expected every item was significantly higher on average for the highest-risk group of drivers (all at $p < .001$). To illustrate, the means (standard deviations) of a number of items from different subscales are provided. From the *transient violations* subscale, “you went up to 10 km/hr over the speed limit”: highest-risk drivers 3.2 (0.9), medium risk drivers 2.4 (0.9), lowest risk drivers 1.8 (0.7). From the *risky driving exposure* subscale, “you drove when you knew you were tired”: highest-risk drivers 3.1 (0.8), medium risk drivers 2.3 (0.9), lowest risk drivers 1.8 (0.7). From the *driver mood* subscale, “your driving was affected by negative emotions like anger or frustration”: highest-risk drivers 3.0 (1.0), medium risk drivers 1.9 (0.7), lowest risk drivers 1.3 (0.5).

The young novice drivers also appeared to have some insight into the risky nature of their self-reported driving behaviour. The highest-risk group reported that their driving was less safe and more risky than the other two groups (Table 2). Perhaps unsurprisingly, the highest-risk group reported that bending rules was *less* dangerous than the other two groups. The highest-risk group also reported significantly greater willingness to speed, intentions to and likelihood of bending the road rules in their future driving.

4. Discussion

Young drivers continue to be overrepresented in road crash, injury and fatality statistics, suggesting that interventions targeting particular groups of young novice drivers may be required in addition to broad countermeasures such as GDL. The findings suggest that particular risky behaviours, such as pre-Licence driving, unsupervised Learner driving, recording of extra hours – that is, hours not actually driven – in logbooks, and involvement in

a crash as a Learner driver could be an early indicator that the novice driver may actually be a problem young driver. Further, reliance upon crash-involvement is problematic due to the multitude of variables which influence whether the driver crashes or not (Evans, 1991), and dependence upon offence detection is problematic due to enforcement constraints and many opportunities to offend without detection. Therefore crashes and offences during the first six months of the P1 licence may also indicate that the novice is a problem young driver.

Table 2: Self-reported attitudes and driving intentions

Self-reported Measure	Cluster			Significance
	One <i>n</i> = 49	Two <i>n</i> = 163	Three <i>n</i> = 166	
Dangerousness	2.4 (1.1)	2.0 (1.0)	1.6 (0.8)	< .001
Safe self assessment	4.2 (1.4)	5.0 (1.3)	5.4 (1.2)	< .001
Risk self assessment	3.8 (1.4)	2.4 (1.1)	1.9 (1.0)	< .001
Likelihood	4.7 (1.5)	3.6 (1.8)	2.3 (1.4)	< .001
Intentions	4.1 (1.6)	3.1 (1.6)	1.8 (1.2)	< .001
Willingness to speed	9.9 (4.2)	6.8 (3.6)	4.9 (3.8)	< .001

Note. All constructs were measured in the Provisional survey.

The next stumbling block to addressing the problem young driver is *what* to do with them, and *when* to intervene, once they have been identified. The research has identified a noteworthy group of problem young drivers – 13% of the young driver participants, almost double that of Vassallo et al (2007) – and existing countermeasures such as Queensland’s enhanced-GDL program do not appear to be reaching these drivers. Whilst research consistently reveals that younger age is associated with greater risk, the social and political unacceptability of systemic measures such as raising the independent driving age is likely to prevent its adoption. Therefore targeted interventions should be considered for implementation during the pre-Licence, Learner, and P1 licence specifically for these problem young drivers. The riskiest drivers reported that their driving behaviour was indeed risky; therefore education campaigns that point out the risks associated with such behaviour are unlikely to be effective (e.g., Ulleberg, 2002). Rather, a range of interventions appear to be required (Williams, 2006), ranging from psychosocial interventions which can address psychological distress experienced as anxiety and depression (Scott-Parker et al., 2011), to greater enforcement of speed limits in particular (Scott-Parker et al., in press a).

Parents are also pivotal in the learning-to-drive process (Simons-Morton, Ouimet, & Catalano, 2008), from providing most of the in-car instruction for the Learner (Scott-Parker, Bates et al., 2011), to administering rewards and sanctions for the novice’s driving behaviours (Scott-Parker et al., in press c). Parents can also monitor car use during the pre-Licence and Learner periods, and should be encouraged to *actively* supervise and therefore monitor general and GDL-specific road rule compliance during the Learner period (Scott-Parker et al., in press a). Whilst sharing the family vehicle rather than independent vehicle ownership can be protective and is associated with less risky driving behaviour – highlighting the potential for an ecological intervention – preventing or restricting vehicle ownership during the earliest phases of independent driving is highly problematic (e.g., exemptions to exclusions, policing compliance with restrictions etc.).

Interestingly a significantly larger proportion of highest-risk drivers were employed full-time and these drivers may be expected to have greater driving exposure associated with commuting to and from places of employment. As such, exposure-reduction measures (Crettenden, 1994) which remove opportunities to be problem young drivers, including public transportation alternatives, may be effective in reducing their on-road risk. Workplace interventions may also prove effective. Further, research consistently highlights the influence

of sensation seeking propensity upon risky driving behaviour (see Jonah, 1997 for a review) and similar findings regarding the influence of reward sensitivity (Scott-Parker et al., 2012b) suggest that interventions begin to consider how to remove rewards and sensation seeking opportunities for the risky young driver.

The research had a number of strengths and limitations. The research operationalised a longitudinal, self-report methodology using reliable instruments. Whilst self-report has been criticised as vulnerable to biases such as recall errors and impression management (e.g., see Lajunen & Summala, 2003), the anonymity of the online survey and the high report of risky driving behaviours including driving after drinking suggest that their responses were not unduly influenced. Further, recent cohort research in New South Wales reported a high correlation between self-reported offences and crashes and official records (Ivers et al., 2009). Most importantly, information regarding many personal characteristics (e.g., depression, sensation seeking propensity) and driving behaviours (e.g., driving when tired, driving when influenced by their emotions) cannot be accessed via alternative means.

Importantly, some of the previous research (e.g., undertaken within the Australian context, Kleisen, 2011; Vassallo et al., 2007) has grouped drivers with both Learner and Provisional driver's licences. This is problematic not only as the Learner has less experience driving on the road and therefore developing a driving style, but also because the behaviour of Learners are likely to be mediated by the supervisor and not a true reflection of their driving behaviour. By comparison, the present research used data gathered six months after commencement of independent driving only to identify the different subgroups of drivers.

It should be noted that the participants may not reflect the characteristics, behaviours and attitudes of the novice driver population of Queensland. The Learner Survey had a low response rate (14.4% of eligible Learners of all ages volunteered to participate, however the age of non-participants could not be determined due to Privacy restrictions). The Provisional Survey had a high attrition rate (66.9%) which may be attributable to Queensland's extreme weather conditions during the follow-up period (AAP, 2011). Overall, more females than males participated; however given the small sample of males separate cluster analyses for each gender were not conducted. Further, in contrast to earlier research which reported a greater proportion of males in the highest-risk cluster of drivers (e.g., Vassallo et al., 2007), males were relatively equally represented in each cluster.

Further research is required to determine the ability of the indicators such as pre-licence driving, unsupervised driving, and high BYNDS scores to differentiate between young novice drivers at high- and low-risk of injury in a road crash. Additional research could also examine the characteristics and behaviours of the highest-risk young drivers by traffic offence type and crash-culpability (Wundersitz, 2007). This may result in more effective interventions targeting sub-groups of young drivers. In addition, males consistently emerge in the literature as more risky, more crash-involved drivers. Therefore recruitment of a larger sample of drivers and males in particular, and subsequent separate cluster analyses for each gender, may reveal avenues of gender-specific interventions. Whilst higher BYNDS scores during both the Learner and first six months of the Provisional 1 licences are also indicative of a potential problem young driver, operationalising this instrument requires consideration.

5. Conclusions

The issue of the young driver problem has been well-established in the literature, and a wealth of countermeasures targeting this driving cohort has been developed, implemented, and some have been evaluated. To date, GDL appears to be the most successful of these; however young drivers persist in their overrepresentation in crashes, and the injuries and fatalities arising from these. The problem young driver concept similarly has been well-

established in the literature; however there has been a limited research and policy development in the area. Principally this has been because of operational difficulties, particularly the lack of effective criteria to identify the problem young driver. Following on from this, there is a dearth of interventions which can effectively address the increased risks posed by this group of young drivers.

Cluster analysis using the responses of 378 drivers yielded three clusters of drivers, ranging from lowest- to highest-risk. The highest-risk drivers reported significantly greater anxiety and depression, reward sensitivity and sensation seeking propensity. A significantly larger proportion of the highest-risk drivers reported engaging in pre-Licence driving, unsupervised Learner driving, submitting inaccurate logbooks, being involved in a crash as a Learner and P1 driver, and being detected for an offence and talking their way out of a ticket as a P1 driver. The highest-risk drivers also reported considerably more on-road risky driving behaviours like speeding, and more risky attitudes towards driving in general. Further research is required to verify the usability and accuracy of identification criterion such as pre-Licence driving, and a multi-faceted countermeasure approach from pre-licensure to the Provisional period appears to be required.

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