Confirmatory factor analysis of the Behaviour of Young Novice Drivers Scale (BYNDS)

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Abstract

Purpose: The greatly increased risk of being killed or injured in a car crash for the young novice driver has been recognised in the road safety and injury prevention literature for decades. Risky driving behaviour has consistently been found to contribute to traffic crashes. Researchers have devised a number of instruments to measure this risky driving behaviour. One tool developed specifically to measure the risky behaviour of young novice drivers is the Behaviour of Young Novice Drivers Scale (BYNDS) (Scott-Parker et al., 2010). The BYNDS consists of 44 items comprising five subscales for transient violations, fixed violations, misjudgement, risky driving exposure, and driving in response to their mood. The factor structure of the BYNDS has not been examined since its development in a matched sample of 476 novice drivers aged 17-25 years.

Method: The current research attempted to refine the BYNDS and explore its relationship with the self-reported crash and offence involvement and driving intentions of 390 drivers aged 17-25 years ($M = 18.23$, $SD = 1.58$) in Queensland, Australia, during their first six months of independent driving with a Provisional (intermediate) driver's licence. A confirmatory factor analysis was undertaken examining the fit of the originally proposed BYNDS measurement model.

Results: The model was not a good fit to the data. A number of iterations removed items with low factor loadings, resulting in a 36-item revised BYNDS which was a good fit to the data. The revised BYNDS was highly internally consistent. Crashes were associated with fixed violations, risky driving exposure, and misjudgement; offences were moderately associated with risky driving exposure and transient violations; and road-rule compliance intentions were highly associated with transient violations.

Conclusions: Applications of the BYNDS in other young novice driver populations will further explore the factor structure of both the original and revised BYNDS. The relationships between BYNDS subscales and self-reported risky behaviour and attitudes can also inform countermeasure development, such as targeting young novice driver non-compliance through enforcement and education initiatives.

Keywords

Young Drivers, Novice Drivers, Risky Driving, Confirmatory Factor Analysis, BYNDS

1. Introduction

1.1 Young novice drivers

The road safety literature has documented the overrepresentation of young novice drivers in fatalities and injuries arising from car crashes around the world for decades. Drivers aged 17-24 years comprised 13.4% of licensed drivers in the Australian state of Queensland in 2010 but they contributed 20.0% of the road toll. In that same year, drivers with a Provisional licence represented 5.3% of the licensed driving population but they contributed 8.6% of the state's fatalities, and 25.3% of road users who were fatally injured died as a result of a crash involving a young driver (Department of Transport and Main Roads (DTMR), 2011).

Fundamental to reducing the risky behaviour of young novice drivers through targeted interventions such as graduated driver licensing (GDL) programs is the *measurement* of the risky behaviour of the young novice driver. A multitude of methodologies (eg., case control, Lam et al., 2003; naturalistic observations, Rosenbloom et al., 2007; logbook analyses, Harrison, 2004; crash insurance reports, Cooper et al., 1995) and a variety of purpose-built and general scales (eg., Speeding Perception Inventory, Gabany, et al., 1997; Driver Behaviour Questionnaire, Lawton et al., 1997) have been used to measure the risky behaviour of young novice drivers. Few measurement scales, however, are designed specifically to explore young novice driver risky behaviour (e.g., the DBQ was developed from and for use in adult drivers of all ages).

Whilst self-report has been criticised as being methodologically-unsound as it may be vulnerable to biases such as impression management which can compromise the accuracy of the data, it can be challenging for researchers to identify novice driver risky behaviour – such as driving whilst fatigued and missing an exit or turn whilst driving– without self-report measures. Therefore it is vital that reliable, comprehensive and valid tools specifically designed to measure

the risky behaviour of young novice drivers be used to inform countermeasure development and evaluation.

1.2 The Behaviour of Young Novice Drivers Scale (BYNDS)

The Behaviour of Young Novice Drivers Scale (BYNDS) was developed by Scott-Parker et al. (2010) with the aim of providing a reliable and valid instrument to measure the risky behaviour of young novice drivers specifically. In their study, 761 tertiary students aged 17-25 years ($M = 19$ years, $SD = 1.59$, mode = 18 years) with a Provisional driver's licence were recruited from Queensland's major tertiary institutions via a broadcast email. Participants completed 63 risky driving items derived from the literature relating to young driver crash risk and GDL restrictions as part of a larger online survey. Participants also self-reported their offence and crash involvement as a Provisional driver, and their intentions to comply with the road rules, including GDL restrictions, within the next year. An exploratory factor analysis of the responses of 238 males and 238 females matched for age and tertiary institution using principal components extraction with oblique promax rotation identified five factors. The items within each factor were summed and comprised five subscales. These subscales were then summed to create a composite BYNDS score. The BYNDS was highly internally consistent (Cronbach's $\alpha = .95$).

Table 1 lists the subscales and their corresponding items. As can be seen, the *transient violations* subscale measures driving behaviours that are able to be performed multiple times during the journey; the *fixed violations* subscale measures items that are more stable in nature across the journey; the *misjudgement* subscale reflects driver errors; the *risky exposure* subscale measures the young novice driver's exposure to risky driving times; and the *driver mood* subscale measures the driver's emotive response to driving. Driver mood, transient and fixed

violations were weakly associated with self-reported crash involvement, fixed and transient violations were moderately associated with self-reported offence involvement, and transient violations were highly associated with intentions to comply with road rules.

[Insert Table 1 here]

1.3 Study aims

The BYNDS was developed using a state-wide sample of *tertiary* students. In addition, the very high internal consistency indicates there may be some redundancy within the BYNDS' subscale(s). Therefore it is timely that the BYNDS be applied in a second young novice driver sample, and the factor structure of the BYNDS be examined. The study had two aims: (a) to examine the BYNDS, self-reported crashes, offences, and intentions characteristics of a second young novice driver population in Queensland, Australia; and (b) to undertake a confirmatory factor analysis of the BYNDS with the goal of developing a parsimonious, internally-consistent revised version which is consistent with self-reported risky behaviour of the young novice drivers.

2. Method

2.1 Participants

Three hundred and ninety (113 males, 29.0% male) drivers aged 17-25 years ($M = 18.23$, $SD = 1.58$, Mode = 17, Median = 18) completed a 30-minute online Survey. All drivers had held a Provisional 1 (P1) driver's licence for six months. The participants represented the Queensland population according to access to goods, services and social interactions (Commonwealth Department of Health and Aged Care, 2001); to illustrate, 60.0% of the state's population lived in inner city areas in 2006 (Australian Bureau of Statistics, 2010), and 61.8% of the participants

resided in inner city areas, and 2.0% of the state's population and 2.2% of the study participants resided in remote areas.

2.2 Measures

Participants reported their age and gender and completed the 44-item BYNDS (Scott-Parker et al., 2010) (1 = *never*, 5 = *almost always*). Participants also responded to items asking if they had been in a car crash and been detected by Police for committing a driving offence as a driver with a Provisional licence (*yes, no*); and if they were likely to bend any road rules, including GDL provisions, over the next year (1 = *definitely will not*, 7 = *definitely will*).

2.3 Procedure and Design

Every Learner driver in Queensland who passed their practical driving assessment and therefore progressed from a Learner to a Provisional 1 (P1) driver's licence in the period April through June 2010 was invited to participate in a longitudinal research project exploring the behaviours and attitudes of novice drivers (due to Privacy restrictions, the invitation was issued by DTMR on behalf of the research team). These drivers completed the first survey exploring their behaviours as Learner drivers at the time of recruitment. A reminder letter providing the hyperlink for the online survey was posted to 9393 drivers who were eligible to participate (again, this letter was issued by DTMR on behalf of the research team). Six months later, the Learner participants completed their second survey exploring their behaviours and attitudes whilst they were P1 drivers. Two reminders which contained the online survey hyperlink were sent to the email address provided in the first (Learner) survey. The online survey tool was created in KeySurvey Enterprise Online Survey Software. Only eligible novice drivers received the survey hyperlink, and the survey site is securely maintained by the Authors' research

institution. The behaviours and attitudes reported in the second survey were used in the current analyses.

2.4 Statistical Analyses

Measures of internal consistency utilised Cronbach's alpha (α). Bivariate correlations between continuous variables utilised the non-parametric Spearman's correlation coefficient (r_s). Bivariate correlations between continuous and dichotomous variables utilised the non-parametric Kendall's tau-b (τ) correlations. Confirmatory factor analysis (CFA) was undertaken to examine the fit of the BYNDS model of Scott-Parker et al. (2010). All analyses were conducted using AMOS version 18 and PASW version 18.0.

3. Results

3.1 Psychometric properties of the original BYNDS subscales and scale

Table 1 also reports the means and standard deviations for the individual items within the original BYNDS. On average, the young novice drivers reported high levels of exposure to risk, such as driving on the weekend and at night, moderate levels of risky driving as evidenced by self-reported speeding and driving whilst affected by their mood and emotions, and driving errors such as missing exits and turns, and lower levels of risky behaviours such as driving without their seatbelts.

Table 2 reports the mean, standard deviation, and α for each of the subscales and the composite BYNDS for the P1 drivers. The participants reported a large amount of risky driving exposure (evidenced by the average score per item = 2.80, on a 5-point scale), a moderate amount of transient violations (1.73) and driving in response to mood (1.78), and some misjudgement (1.36) and fixed rule violations (1.06). The composite BYNDS and the five subscales were highly internally consistent (Table 2).

[Insert Table 2 here]

Table 2 also shows the correlations amongst (sub) scales, self-reported crashes, offences and driving intentions. Thirty-seven (9.6%) participants reported being involved in a car crash (8.9% of females, 10.7% of males), and 46 (11.8%) participants reported being detected for an offence (9.5% of females, 17.7% of males), as a driver with a Provisional licence. Most participants intended to follow the road rules in the next year ($n = 248$, 64.8%), with 74 participants (19.3%) unsure if they were going to follow the rules or not and the remaining 61 participants (15.9%) intending to break the road rules in the next year. The bivariate correlations amongst the subscales, the composite BYNDS, crashes, offences and intentions were all statistically significant. The transient violations subscale was most strongly associated with driving intentions. Driving at risky times and transient violations subscales were most strongly associated with self-reported offence detection. Fixed violations and driving at risky times subscales were most strongly associated with self-reported crash involvement.

3.2 Confirmatory factor analysis

Prior to confirmatory factor analysis, the individual BYNDS items and the subscales were assessed for normality. The items exhibited considerable non-normality as measured by skew and kurtosis (for example, “Your passengers didn’t wear seatbelts: skew = 9.64, kurtosis = 102.56). This was not an unexpected finding, as most drivers generally follow the road rules, including GDL restrictions. There are implications for the CFA however, as non-normal data will result in an inaccurate assessment of fit (particularly the chi-square test), therefore the model may erroneously be rejected (Anderson and Gerbing, 1988). Transformation of each item did not ameliorate the violation of the normality assumption. In addition to the univariate non-normality, the data also were found to exhibit multivariate non-normality (kurtosis > 7, West et al., 1995).

Therefore it was decided that the confirmatory factor analysis would operationalise the raw data and utilise the Bollen-Stine bootstrap method using 2000 bootstrap samples to adjust for non-normality (Bollen and Stine, 1992) with maximum likelihood estimation. Seven univariate outliers who reported commonly driving in a very risky way were identified prior to the CFA and these were removed from further analyses to facilitate statistical fidelity. In addition, the covariances were examined and were found to be consistent with the factor structure of the exploratory factor analysis conducted in the development of the original BYNDS (Scott-Parker et al., 2010).

The CFA required an assessment of good model fit which was determined by a non-significant Bollen-Stine chi-square (χ^2). In addition, the Joreskog-Sorbom Goodness of Fit Index ($GFI \geq .95$ indicative of good model fit for a normally-distributed sample), Bentler's Comparative Fit Index ($CFI \geq .95$), the Steiger-Lind Root Mean Square Error of Approximation ($RMSEA \leq .08$) including 90% confidence intervals (Kline, 2011), the Tucker-Lewis Index ($TLI \geq .95$), and Akaike's Information Criteria (AIC) were examined and used for the purposes of model comparison and improved model fit during the iterative CFA process. Modification indices were not used to guide improvement of model fit, rather examination of the individual item loadings informed the iterative removal of items. The original BYNDS model was not a good fit to the data. Table 3 summarises the items that were removed and the corresponding goodness-of-fit indices. After iterative removal of eight items, the final model was a good fit to the data.

[Insert Table 3 here]

In an attempt to improve model parsimony, the item "*You travelled in the right lane on multi-lane highways*" was removed from the transient violations subscale. Whilst this behaviour is

illegal (punishable by a AUD\$60 fine and two licence demerit points, DTMR, 2010), this item was considered to be the item least likely to contribute to the young novice driver being involved in a crash within this subscale. The model was not a good fit to the data, and it was decided that the revised 36-item BYNDS would be retained at this time. Figure 1 illustrates this model.

[Insert Figure 1 here]

3.3 The revised BYNDS and its subscales

The psychometric properties of the revised BYNDS composite scale and its subscales are summarised in Table 4, which reports the mean, standard deviation, and α of the revised (sub) scales, as well as the bivariate correlations between the revised BYNDS (sub) scales and the original BYNDS (sub) scales, self-reported crashes and offences, and driving intentions. As shown, the revised BYNDS (sub) scales were internally consistent, and as expected they were also strongly correlated with the corresponding original (sub) scales.

[Insert Table 4 here]

The revised BYNDS transient violations subscale was weakly associated with self-reported crashes, moderately associated with self-reported offences, and strongly associated with driving intentions. The revised fixed violations subscale was moderately associated with crashes, offences, and intentions. The revised misjudgement, risky exposure, and driver mood scales were weakly associated with crashes and offences, and moderately associated with intentions. The revised BYNDS composite scale was weakly associated with crashes, moderately associated with offences, and strongly associated with driving intentions.

4. Discussion

The BYNDS emerged from a need for a tool designed specifically for measuring the self-reported risky behaviour of the young novice driver. In addition to the requirement of road safety

researchers for instruments that are reliable and valid, and given that multiple measures are typically incorporated in programs of research, parsimonious tools are fundamental. The items within the original, and therefore the revised, BYNDS were drawn from the road safety literature and GDL restrictions. The original scale and subscales exhibited very high internal consistency (Scott-Parker et al., 2010), and these findings were repeated in the current research, notwithstanding the non-normality of the data.

Further, behavioural measures apart from traditional road safety outcomes of crashes and offences are required. This is particularly the case as not every road rule transgression is detected by regulatory authorities, such as the Police. Crashes are also comparatively rare events and do not arise from every risky driving manoeuvre; rather, engaging in risky driving behaviour places all drivers – and especially the young novice driver – at greater risk of crashing and incurring harm such as injury and fatality. Behavioural data, in addition to crash and offence data, can also be used to gauge the effectiveness of existing and new countermeasures. Interestingly, the risky behaviour of young novice drivers in Queensland appears to be comparatively constant, irrespective of whether they specifically were tertiary students (Scott-Parker et al., 2010) or novice drivers in general (the current research), and how long they had held their Provisional driver's licence (0-36 months, Scott-Parker et al., 2010, 6 months in the current research).

A more parsimonious 36-item version of the BYNDS which maintains validity and reliability was obtained in the current study. Importantly, the revised BYNDS comprises five subscales of between 3 and 12 items each that can be used individually or in combination. The CFA also provided interesting insight into the risky behaviour of young novice drivers in Queensland. The majority of young novice drivers in Queensland have been found to comply with both general road rules and GDL-specific restrictions (Scott-Parker et al., 2011; Scott-

Parker et al., under review). In addition, the majority of the items removed in the Revised BYNDS reflect illegal behaviour – specifically pertaining to compliance with zero blood alcohol limits, wearing of seatbelts, not driving high-powered vehicles, and indicating when changing lanes – suggesting that on the whole young novice drivers in Queensland are compliant with these restrictions.

It is noteworthy that whilst the CFA was undertaken with a sample in excess of 200 participants, an oft-cited minimum sample size, Kline (2011) recommends larger sample sizes. Seventy percent of the sample was aged 17 and 18 years, and more females than males participated in the longitudinal research project. In comparison, nearly 52% of Queensland's P1 licence population in 2009 was male and 62.1% were aged 17 or 18 years. Separate gender analyses were precluded by the small sample of male participants. However it is noteworthy that male young novice drivers report engaging in risky driving behaviour and therefore, similar to the approach undertaken in the development of the Original BYNDS, further refinement of the BYNDS should consider again utilising a sample matched for age and gender.

Notwithstanding the gender differences, the sample adequately represented the Queensland population according to rurality and access to goods, services and social interactions (Commonwealth Department of Health and Aged Care, 2010). Even though every novice driver in Queensland was eligible to participate in the longitudinal research (see Scott-Parker et al., 2011, for the study methodology), and the chance to win petrol vouchers and movie tickets were offered as incentives, the Learner survey was characterised by a low response rate (14.4% of the 9393 Learners of all ages who progressed to a P1 licence participated). The second survey experienced considerable attrition, much of which may be attributable to Queensland's extreme weather including widespread flooding and extensive and lengthy power disruptions at the time

of follow-up (AAP, 2011). Importantly the analyses were conducted with the responses to the second survey only. Anonymity and the online nature of the research are anticipated to have ameliorated any self-presentation or other biases which may have influenced the accuracy of self-report data.

The subscales of the BYNDS can inform countermeasure evaluations, development, and can have implications for government policy. To illustrate, consistent with the findings of Scott-Parker et al. (2010), education and enforcement activities should target transient and fixed violations to improve young novice driver road safety. In addition, it appears that both risky driving exposure and misjudgement are also problematic for the young novice driver. For the novices with only six months independent driving experience, risky exposure and misjudgement were associated with crashes and offences. These relationships suggests that government policy may need to address deficits in driving experience in the Learner phase of licensure, and that measures targeting risky driving exposure may need to be introduced in the earliest Provisional phase of licensure. The Queensland GDL is currently being evaluated by an Australian university research centre, and the results of this study could inform the interpretation of the evaluation findings.

Future research should include confirmatory factor analyses of the original and the revised BYNDS measurement models, and in the interests of parsimony further revisions of the BYNDS are recommended. Furthermore, alternate measurement models which consider a second-order factor structure subsuming transient and fixed violations may provide a better fit to the data. The ability of the BYNDS (sub) scales to predict crashes and offences could also be examined, and the BYNDS scores for offenders and crash-involved drivers compared. Future research could also consider separate gender analyses, as well as using methods other than an

online methodology. In addition, the BYNDS characteristics of different young novice driver populations around the world can be examined, including the relationships between the subscales and offences and crashes. Objective behavioural measures such as driving simulation, insurance and Police records of crashes and offences could also be incorporated into these analyses.

Preliminary analyses suggest the BYNDS (sub) scales are associated with self-reported crashes and offences, and larger sample sizes can allow full structural equation modelling incorporating additional predictors such as driving exposure to enhance our understanding of the risky driving behaviour of young novice drivers.

5. Conclusions

The risky behaviour of young novice drivers has long been recognised to contribute to their overrepresentation in fatalities and injuries arising from road crashes. The BYNDS was designed specifically to measure this risky behaviour, and has been found to be reliable. Furthermore, the significant associations between the various subscales and self-reported crashes and offences suggest that it is a valid measure. However, this validity needs to be confirmed in future research using objective measures of driving behaviour and official driving records. The risky behaviour of participants as measured by the BYNDS in the current study and Scott-Parker et al.'s (2010) previous study was found to be consistent. In the current study, the BYNDS was refined to form a reliable, valid and parsimonious version. Utilising the revised BYNDS, during the first six months of independent driving, self-reported crashes were associated with fixed violations, risky driving exposure, and misjudgement; self-reported offences were moderately associated with risky driving exposure and transient violations; and road-rule compliance intentions were highly associated with transient violations. Further application of the original and the revised BYNDS is required to identify additional and appropriate refinements.

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Footnote

¹ In the enhanced-GDL program in Queensland, young novice drivers progress from a Learner to a Provisional 1 (P1) licence after successfully completing a practical driving assessment. A P1 driver's licence must be held for a minimum of 1 year. P1 drivers are prohibited from carrying more than one young passenger (excluding immediate family members) between 11pm and 5am (Queensland Transport, 2007).

² Logistic regression analyses were conducted to explore the relationship between the BYNDS subscales and self-reported crash involvement and violations. The subscales explained approximately 12.2% of variance (Nagelkerke R^2) in self-reported crash involvement and 16.6% of variance (Nagelkerke R^2) in self-reported violations. Risky driving exposure was a significant predictor of both crashes ($p = .004$) and offences ($p = .009$); and fixed violations was a significant predictor of crashes ($p = .045$). Caution should be exercised in the interpretation of these findings, however, as the very small sample sizes preclude definitive conclusions.

Table 1

The items within the subscales of the Behaviour of Young Novice Drivers (BYNDS) and their mean and standard deviation

Items	<i>M</i>	<i>SD</i>
<i>Transient Violations</i>		
You drove over the speed limit in areas where it was unlikely there was a radar or speed camera	1.87	0.93
You went 10-20 km/hr over the speed limit (eg. 72 km/hr in a 60 km/hr zone, 112 km/hr in a 100 km/hr zone)	1.69	0.87
You deliberately sped when overtaking	1.91	1.02
You sped at night on roads that were not well lit	1.37	0.67
You went up to 10 km/hr over the speed limit (eg. 65 km/hr in a 60 km/hr zone, 105 km/hr in a 100 km/hr zone)	2.22	0.94
You went more than 20 km/hr over the speed limit (eg. 60 km/hr in a 40 km/hr zone, 120 km/hr in a 100 km/hr zone)	1.28	0.58
You raced out of an intersection when the light went green	1.77	0.92
You travelled in the right lane on multi-lane highways	2.09	1.03
You sped up when the lights went yellow	2.05	0.91
You went too fast around a corner	1.73	0.72
You did an illegal U-turn	1.33	0.61
You overtook someone on the left	1.56	0.81
You spoke on a mobile that you held in your hands	1.35	0.67
<i>Fixed Violations</i>		
Your passengers didn't wear seatbelts	1.04	0.31
You drove after taking an illicit drug such as marijuana or ecstasy	1.03	0.22
You carried more passengers than could legally fit in your car	1.06	0.30
You didn't always wear your seatbelt	1.03	0.27
You drove without a valid licence as because you hadn't applied for one yet or it had been suspended	1.01	0.15
You didn't wear a seatbelt if it was only for a short trip	1.03	0.19
If there was no red light camera, you drove through intersections on a red light	1.04	0.27
You carried more passengers than there were seatbelts for in your car	1.04	0.23
You drove when you thought you may have been over the legal alcohol limit	1.12	0.36
You drove a high-powered vehicle	1.09	0.39
<i>Misjudgements</i>		
You misjudged the speed when you were exiting a main road	1.27	0.50

You misjudged the speed of an oncoming vehicle	1.34	0.53
You misjudged the gap when you were turning right	1.51	0.48
You misjudged the stopping distance you needed	1.45	0.63
You turned right into the path of another vehicle	1.14	0.38
You misjudged the gap when you were overtaking another vehicle	1.15	0.41
You missed your exit or turn	1.96	0.79
You entered the road in front of another vehicle	1.39	0.57
You didn't always indicate when you were changing lanes	1.42	0.79
<hr/> <i>Risky Exposure</i>		
You drove on the weekend	3.86	0.97
You drove in the rain	3.18	0.73
You drove at peak times in the morning and afternoon	3.07	1.05
You drove at night	3.40	0.99
You drove at dusk or dawn	2.77	1.05
You carried your friends as passengers at night	2.24	1.00
You drove when you knew you were tired	2.20	0.90
Your car was full of your friends as passengers	1.96	0.97
You went for a drive with your mates giving you directions to where they wanted to go	2.25	1.07
<hr/> <i>Driver Mood</i>		
Your driving was affected by negative emotions like anger or frustration	1.77	0.84
You allowed your driving style to be influenced by what mood you were in	1.78	0.82
You drove faster if you were in a bad mood	1.70	0.90

Adapted from Scott-Parker, Watson, & King, 2010. The mean and standard deviations were calculated using the raw data in PASW 18.0.

Table 2

Psychometric properties of and the bivariate correlations between the original Behaviour of Young Novice Drivers (BYNDS) (sub) scales, self-reported crashes, offences, and anticipated driving behaviour

Measure	<i>n</i>	<i>M</i>	<i>SD</i>	α	Skew	Kurtosis	Correlations with (sub) scales					
							I	II	III	IV	V	BYNDS
I Transient Violations	13	22.56	7.40	.89	1.20	1.24	1.00					
II Fixed Violations	10	10.58	1.75	.75	6.25	52.38	.37***	1.00				
III Misjudgement	9	12.22	2.85	.73	1.46	2.88	.43***	.20***	1.00			
IV Risky Exposure	9	25.19	5.23	.81	.14	.19	.50***	.27***	.38***	1.00		
V Driver Mood	3	5.34	2.33	.87	1.11	1.19	.52***	.24***	.39***	.40***	1.00	
BYNDS Composite	44	75.88	15.04	.92	.96	1.19	.87***	.42***	.63***	.79***	.65***	1.00
Crash	–	–	–	–	–	–	.10*	.22***	.14**	.18***	.12*	.17***
Offence	–	–	–	–	–	–	.19***	.17***	.14**	.19***	.13**	.21***
Intentions	1	2.66	1.66	–	.74	-.43	.48***	.28***	.19***	.25***	.37***	.44***

Bivariate correlations between continuous variables utilised the non-parametric Spearman's correlation coefficient (r_s). Bivariate correlations between continuous and dichotomous variables utilised the non-parametric Kendall's tau-b (τ) correlations. – = not applicable. * $p < .05$, ** $p < .01$, *** $p < .001$. Means, standard deviations, Cronbach's alpha, skew, kurtosis, and correlations were calculated using the raw data in PASW 18.0.

Table 3

Goodness-of-fit indices and the items removed iteratively from the Original Behaviour of Young Novice Drivers (BYNDS) Scale

Item	Bollen-Stine χ^2	<i>p</i>	GFI	CFI	TLI	RMSEA (95% CI)	AIC
Full model (n = 44 items)	2340.41	.006	.80	.77	.76	.06 (.06-.07)	2536.41
Step 1 Removed five items with loading < .30	1703.58	.04	.83	.83	.81	.05 (.05-.069)	1879.58
<i>You went for a drive with your mates giving you directions to where they wanted to go</i>							
<i>You drove when you thought you may have been over the legal alcohol limit</i>							
<i>You drove a high-powered vehicle</i>							
<i>Your passengers didn't wear seatbelts</i>							
<i>You didn't always indicate when you were changing lanes</i>							
Step 2 Removed one item with lowest factor loading	1540.50	.02	.84	.84	.83	.06 (.05-.06)	1712.50
<i>You didn't wear a seatbelt if it was only for a short trip</i>							
Step 3 Removed one item with lowest factor loading	1418.13	.04	.85	.85	.84	.06 (.05-.06)	1586.13
<i>You went too fast around a corner</i>							
Step 4 Removed one item with lowest factor loading	1285.74	.06	.86	.87	.86	.05 (.05-.06)	1449.74
<i>Your car was full of your friends as passengers</i>							

Table 4

Psychometric properties of the revised Behaviour of Young Novice Drivers (BYNDS) (sub) scales, and the correlation of the revised (sub)scales with the original BYNDS (sub)scales, crashes, offences, and anticipated driving behaviour

Revised BYNDS							Correlations								
Scale	<i>n</i>	<i>M</i>	<i>SD</i>	α	Skew	Kurt.	I	II	III	IV	V	BYNDS	Crash	Off.	Intent.
I Transient V.	12	20.80	7.00	.88	1.17	1.14	.99***	.38***	.41***	.50***	.51***	.86***	.10*	.19***	.62***
II Fixed V.	6	6.27	1.10	.72	6.09	44.07	.33***	.64***	.12*	.18**	.15**	.32***	.24***	.20***	.28***
III Misjudge.	8	10.96	2.59	.73	1.36	2.28	.40***	.19***	.96***	.33***	.35***	.58***	.11*	.12**	.20***
IV Risky Exp.	7	20.79	4.36	.78	.15	.33	.46***	.25***	.31***	.95***	.37***	.71***	.17***	.17***	.30***
V Driver Mood	3	5.34	2.33	.88	1.11	1.19	.53***	.27***	.38***	.40***	1.00	.63***	.12*	.13***	.39***
BYNDS Comp.	36	64.15	13.09	.90	.86	.74	.89***	.42***	.60***	.75***	.65***	.99***	.16***	.21***	.58***

Bivariate correlations between continuous variables utilised the non-parametric Spearman's correlation coefficient (r_s). Bivariate correlations between continuous and dichotomous variables utilised the non-parametric Kendall's tau-b (τ) correlations. * $p < .05$, ** $p < .01$, *** $p < .001$. Kurt. = Kurtosis. Off. = Offence. Intent. = Intentions. Means, standard deviations, Cronbach's alpha, skew, kurtosis, and correlations were calculated using the raw data in PASW 18.0.

Figure 1

The Revised Behaviour of Young Novice Drivers Scale (BYNDS) Model