

VALIDATION OF A DRIVING QUESTIONNAIRE FOR PATIENTS WITH ADHD; THE JEROME DRIVING QUESTIONNAIRE (JDQ)

Jerome Driving Questionnaire (JDQ) 2009 © To be completed by the driver

NAME OF DRIVER: _____
DOB: Day/Month/Year: _____
DATE COMPLETED: _____

Please list all your medications & dosages including over-the-counter medicines with mg doses if known.

1	2	3
4	5	6
7	8	9
10		

INSTRUCTIONS
This section should be completed by the driver. Please rate yourself on the following questions regarding past and current driving history.

Driving History Part A

INSTRUCTIONS
This section should be completed by the driver. Please rate yourself on the following questions regarding past and current driving history.

- At what age did you obtain your driver's license? _____ years, months
- How many times did you take to pass your final driving test?
 1 2 3 or more
- How long have you been driving? _____ (years)
- On average, how much time per day do you spend driving?
 < 1 hour 1-2 hours > 2 hours
- a. Estimate kilometres/miles driven in the last month: _____ city
b. Estimate kilometres/miles driven in the last month: _____ highway

- How many motor vehicle collisions have you been in as a passenger?
 0 1 2 3 or more
- How many motor vehicle collisions have you been in as a driver?
 0 1 2 3 or more
- How many times since you have been driving have you been determined to be at fault in an accident?
 0 1 2 3 or more
- How many times since you have been driving have you had your licence revoked or suspended?
 0 1 2 3 or more
- How many times have you driven when your licence was suspended?
 Never Once Twice Three or more
- Did you ever go joy riding with others in a car? Answer all that apply
 As a driver As a passenger As a passenger when the driver was intoxicated As a driver when before you held a valid license? with alcohol and/or drugs? without alcohol and/or drugs?
- How many times since you have been driving have you received a parking ticket?
- How many times since you have been driving have you received a speeding ticket?
- How many times since you have been driving have you been given a ticket for failing to stop at a stop signal or sign?
- How many times since you have been driving have you been given a ticket for reckless driving?
- How many times since you have been driving have you struck a pedestrian or cyclist while driving?
- How many times since you have been driving have you been given a ticket for driving while intoxicated?
- Have insurance rates increased as a result of driving problems?
 Yes No
- Has car insurance been denied because of driving problems?
 Yes No

JEROME DRIVING QUESTIONNAIRE B 2009 ©

This form can be completed either by you the driver or a close friend or relative who observes you drive

DATE COMPLETED: _____ COMPLETED BY: _____

INSTRUCTIONS
The following questions are about your usual driving style over the last month. Try to answer all the questions. There are no right or wrong answers. Please put a mark "X" on the horizontal scale to indicate your rating regarding driving in the last month when out driving. (a) in the city, (b) on the highway.

Circle the correct answer to the following two questions:
In the last month have you driven (or driven with the driver) in the city?
YES NO
In the last month have you driven (or driven with the driver) on the highway?
YES NO

- Frustration**
a. City
No frustration High frustration
b. Highway
No frustration High frustration
- Risk-taking**
a. City
No risk taking High risk taking
b. Highway
No risk taking High risk taking
- Show anger verbally or physically to other drivers**
a. City
No anger High anger
b. Highway
No anger High anger

- Speeding**
a. City
No speeding Excessive speeding
b. Highway
No speeding Excessive speeding
- Anxiety**
a. City
No anxiety High anxiety
b. Highway
No anxiety High anxiety
- Experience Panic**
a. City
No panic Extreme panic
b. Highway
No panic Extreme panic
- Concentration on Road**
a. City
No concentration problems Major concentration problems
b. Highway
No concentration problems Major concentration problems
- Alert to sudden changes in driving conditions**
a. City
Alert Not Alert
b. Highway
Alert Not Alert

- Easily distracted by sights or sounds in the car or off to the side of the road**
a. City
No distraction High distraction
b. Highway
No distraction High distraction
- Daydreaming**
a. City
No daydreaming Frequent daydreaming
b. Highway
No daydreaming Frequent daydreaming
- Drowsiness**
a. City
No drowsiness Major drowsiness
b. Highway
No drowsiness Major drowsiness
- Anticipating potential dangers from other cars or pedestrians (looking ahead)**
a. City
Always anticipating Never anticipating
b. Highway
Always anticipating Never anticipating

Please note if any of your answers would be changed by driving with passengers. Please describe:

1. Abstract.

Objectives: To report on the validation and clinical utility of the Jerome Driving Questionnaire, an instrument for collecting information regarding driving history and current "strategic" Driving Style in clinical populations.

Design and Methods: A convenience sample of 500 adult patients attending a general psychiatric community out-patient clinic completed standardized measures of psychopathology, Hospital Anxiety and Depression Scale, Beck Depression Inventory, ADHD rating Scale for Adults (Barkley). Factor analytical procedures were used to determine content and construct validity.

Results: The rotated factor structure indicated a four factor solution: Inattention, Impulsivity, Drowsiness and Emotional Lability. These factors correlated with other measures of psychopathology suggesting a general measure of executive functional impairment that cuts across the categorical diagnoses of ADHD, Mood and Anxiety. The instrument demonstrated predictive validity over two years in a normal population and appears to be sensitive to treatment effects in clinical samples.

Conclusions: The Jerome Driving Questionnaire examines information from self and collateral informants and provides a useful clinical profile of patients driving histories and current driving style. In clinical populations it has utility in measuring driving impairment as well as response to treatment. The JDQ also shows promise in predicting future driving risk in both normal and clinical populations.

2. Development of the instrument

During the pharmacological treatment of patients with ADHD patients, most often their spouses commented on an area of functional improvement that was not being asked about. They noted a significant improvement in the patients' driving style; specifically the level of frustration with other drivers, speed, distractibility and general safety. These observations lead to development of a clinical instrument designed to capture the functional improvement in driving described by the patients and their relatives (1).

Recent literature documents the increased risk of driving problems particularly in young drivers with untreated ADHD (2). In Canada, physicians now have a responsibility for identifying and potentially reporting problem drivers with ADHD (3). No readily available metric exists. The JDQ may have utility in this area of medico-legal liability.

The JDQ is now available for use on-line at:
www.adhd-driving.com

3. Demographics and Diagnostic profile

Variable	Frequency	Percent
Age		
18-25	39	8
26-35	121	24.8
36-45	132	27.1
46-55	158	32.4
55+	37	7.6
Gender		
Male	282	57.9
Female	205	42.1
Primary Diagnosis		
Dementia (290)	1	0.2
Schizophrenia (295)	3	0.6
Depression (296)	47	9.6
Paranoid State (297)	1	0.2
Brief Psychotic Disorder (298)	1	0.2
Autism (299)	1	0.2
Anxiety Disorder (300)	129	26.4
Personality Disorder (301)	4	0.8
Alcoholism (303)	4	0.8
Substance Dependence (304)	1	0.2
Sleep Disorder (307)	1	0.2
Separation Anxiety Disorder (309)	5	1
Behavioural Disorder (313)	13	2.7
Attention Deficit Hyperactivity Disorder (ADHD) (314)	191	39.1
Mental Retardation (319)	3	0.6
Marital Problems (898)	25	5.1
Parent/child relationship difficulties (899)	45	9.2
Educational Problem (902)	8	1.6
Missing Values	5	1.0

4. Internal Consistency and Reliability

Variables*	Component	1	2	3	4
Frustration C		.269	.449	.034	.593
Frustration H		.124	.296	.130	.742
Risk-taking C		.301	.742	.152	.233
Risk-taking H		.237	.740	.198	.202
Speeding C		.219	.808	.157	.185
Speeding H		.148	.827	.144	.154
Anxiety C		.316	.216	.091	.723
Anxiety H		.231	.073	.099	.831
Concentration C		.693	.123	.259	.246
Concentration H		.693	.064	.317	.310
Alert C		.271	.168	.794	.185
Alert H		.306	.157	.761	.187
Distracted C		.781	.207	.119	.187
Distracted H		.808	.171	.071	.209
Daydreaming C		.670	.298	.237	.112
Daydreaming H		.700	.357	.222	.105
Drowsy C		.514	.099	.295	.156
Drowsy H		.621	.175	.139	.096
Anticipating Dangers C		.148	.149	.841	.010
Anticipating Dangers H		.226	.146	.839	.018

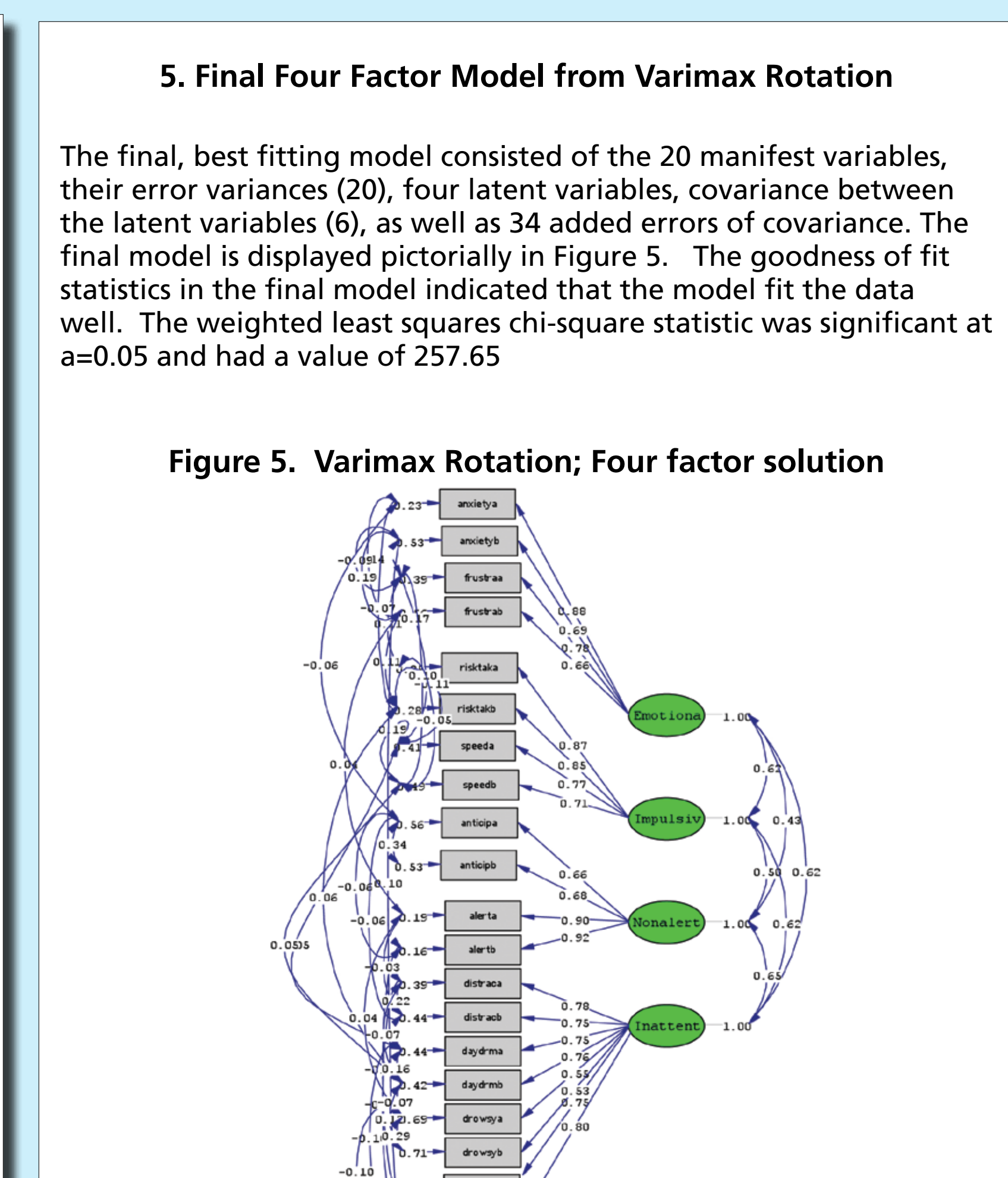
*C=driving in the city, H=driving on the highway

5. Final Four Factor Model from Varimax Rotation

The final, best fitting model consisted of the 20 manifest variables, their error variances (20), four latent variables, covariance between the latent variables (6), as well as 34 added errors of covariance. The final model is displayed pictorially in Figure 5. The goodness of fit statistics in the final model indicated that the model fit the data well. The weighted least squares chi-square statistic was significant at $\alpha=0.05$ and had a value of 257.65

Figure 5. Varimax Rotation; Four factor solution

CHI-SQUARE=237.65, DF=131, P-VALUE=0.00000, RMSEA=0.063



6. Content Validity: expert opinion and literature review

Content validity of the JDQ was assessed during survey construction, prior to commencing this study. Dr. Jerome, a psychiatrist and Dr. Segal, a psychologist, designed the measure based on the available literature regarding knowledge of functional impairments in ADHD, as they are related to driving.

In this study, items in the JDQ were analyzed and critiqued based on review of pertinent literature on ADHD, driving, self-report driving surveys, as well as principles for generating survey questions.

7. Criterion validity. Correlation with history of self reported Motor Vehicle Collisions and collateral JDQ report.

JDQ Variable	City	Highway
Frustration	r = 0.22 n = 306 p = **	r = 0.115 n = 306 p = *
Risk Taking	r = 0.252 n = 306 p = **	r = 0.154 n = 306 p = *
Speeding	r = 0.235 n = 306 p = **	r = 0.119 n = 306 p = *
Anxiety	r = 0.207 n = 306 p = **	r = 0.117 n = 306 p = *
Concentration	r = 0.184 n = 306 p = **	r = * n = 306 p = *

8. Construct Validity

Participants reported highest scores for frustration while driving in the city (5.2 ± 3.0) followed by speeding while driving on the highway (4.6 ± 2.9), and anxiety, distraction and speeding while driving in the city (4.2 ± 3.2, 4.2 ± 3.1, 4.2 ± 2.9, respectively). Patients appeared to have the lowest scores for drowsiness while driving in the city (1.9 ± 2.2), anticipating dangers in the city and on the highway (2.0 ± 2.1; 2.2 ± 2.2, respectively) and alertness on the highway and in the city (2.3 ± 2.3; 2.2 ± 2.3, respectively).

Comparisons of means found no significant differences between groups with Anxiety, Depression and ADHD for any of the JDQ variables. In other words, the JDQ did not differentiate between the diagnostic categories of ADHD, anxiety and depression.

10. Summary

- The JQ is an easily administered metric providing both a retrospective driving history and a current (strategic) driving style profile from both driver and collateral observer.
- The psychometric properties of the instrument show internal reliability and content, criterion and construct validity in a convenience sample of adult out patients presenting with a range of psychiatric symptomatology.
- In a sample of novice normal drivers the instrument shows predicative validity in relation to motor vehicle collision and moving violations at three years based on Ministry of Transportation data.
- Collateral reports, but not self-report on the JDQ in the clinical sample correlated with self-reported lifetime histories of Motor Vehicle Collisions.
- Future diagnostic criteria for Adult ADHD may include problem driving as a criterion. The use of a standardized metric will likely have utility for both diagnostic purposes, as well as for clinical documentation of inquiry regarding problem driving. This is likely to have increasing medico-legal importance in the evolving field of increased risks for driving in ADHD populations.

Correlations between Overall JDQ Factor Scores and Clinical Assessment Variables (N=480)

Factor	ADHD Behaviour Checklist for Adults - Inattention	ADHD Behaviour Checklist for Adults - Impulsivity/Hyperactivity	Hospital Anxiety & Depression Scale Depression Subscale	Hospital Anxiety & Depression Scale Anxiety Subscale	Beck Depression Inventory II
Inattention Factor	.468(**)	.398(**)	.152(**)	.198(**)	.184(**)
Pearson Correlation Sig. (2-tailed)	.000	.000	.001	.000	.000
Impulsivity Factor	-.086	.060	.054	.118(**)	.062
Pearson Correlation Sig. (2-tailed)	.039	.192	.235	.010	.175
Non-Alertness Factor	-.083	-.057	-.136(**)	-.178(**)	-.138(**)
Pearson Correlation Sig. (2-tailed)	.070	.210	.003	.000	.002
Emotional Lability Factor	-.060	-.059	.157(**)	.185(**)	.180(**)
Pearson Correlation Sig. (2-tailed)	.192	.194	.001	.000	.000

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

There is evidence for the construct validity of most JDQ items and factors that were assessed via correlation with other known and widely used psychological assessment scales. The JDQ 'inattention' and 'anxiety' variables show the highest degree of construct validity. Most of the clinical assessment measures employed in this study were not measuring exactly the same concepts as the JDQ and therefore, the many weak and non-significant relationships identified in this study were not surprising. It would appear that the JDQ was measuring a more general "strategic" factor related to driving skill that was not directly measured by the psychometric instruments employed and independent of specific diagnostic categories.

9. Predictive Validity

Human factors predictors of problem driving events

- Total Driving Incidents**

Predictors	Correlation
Gender	.284 p<.001
JDO-risk taking (b)	.403 p<.001
JDO-anger (b)	.326 p<.01
JDO-daydreaming	.325 p<.01
TCI-sentimentality	-.253 p<.04
TCI-cooperation	-.293 p<.01
TCI-compassion	-.303 p<.01
TCI-risk inattentive	.292 p<.02
Barkley-Total	.315 p<.01
CPF-variability	.250 p<.04
- Collisions**

Predictors	Correlation
JDO-risk taking (a)	.282 p<.02
JDO-risk taking (b)	.237 p<.05
JDO-alertness (b)	.279 p<.03
- Violations**

Predictors	Correlation
Gender	.380 p<.002
Grade average	-.291 p<.01
JDO-anger (b)	.364 p<.004
JDO-daydreaming	.477 p<.0001
JDO-risk taking (b)	.383 p<.002
TCI-disorderliness	-.275 p<.02
TCI-cooperation	-.283 p<.02
Barkley-Inattentive	.369 p<.005
Barkley-Total	.368 p<.005

The JDQ was used in a prospective study of 90 healthy novice drivers that were followed for over two years. Outcome was assessed with self-report measures and Ministry of Transportation data.

Linear regression analysis was applied to the Total Driving Incidents data. The model incorporated all the identified human factor predictors, accounting for 32% of the common variance (using the Adjusted R²). The linear regression model for collisions only identified the JDQ-risk taking variable, accounting for six percent of the variance. The JDQ-daydreaming variable and male gender were related to violations, accounting for approximately 37% of the common variation (4).

References

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- Jerome L & Segal AU (2008) "Prediction of Problem Driving Risk in Novice Drivers in Ontario: Part II. Outcome at two years." In Dorn L (Ed) Driver Behavior and Training Vol. 3. Human factors in Road and Rail Transport. Ashgate, Aldershot 2008: (7):75-88

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