

A Profile of Adolescents who Attend Driver Education for the Insurance Discount: Are Insurers Rewarding Bad Risks?

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Article abstract

Problem: The overrepresentation of adolescent drivers in crashes is a robust phenomenon. Driver education (DE) is a popular countermeasure, and in most North American jurisdictions, insurers grant automobile insurance premium discounts to DE graduates. However, over the past 20 years, evaluations have consistently demonstrated that DE does not reduce, and may even increase, crash risk among adolescent novice drivers. Providing premium reduction incentives to DE graduates may possibly increase crash risk in two ways. One, by reducing the overall cost of licensing and car ownership, insurance may increase driving exposure. Two, insurance may increase *morale* hazard, a careless attitude toward prevention. The human and financial losses resulting from adolescent crashes are a serious problem for public health and for insurers. Insurance is also known to increase *moral* hazard, a tendency to make dishonest claims - losses due to fraud are a significant problem for insurers. Therefore, the DE insurance discount may not be optimally efficient for reducing insurers' losses or for improving the public health. One approach to investigating the effects of the DE insurance discount is to study the characteristics and the driving records of adolescents who are insurance-motivated, i.e. those who attend DE partly or entirely for the insurance discount.

Method: A cohort of 1,804 novice drivers 16- to 19-years of age of both sexes completed an extensive questionnaire on learning methods, including motivation to attend or not to attend DE, risk taking, and lifestyles. Questionnaire data were linked on an individual basis with government records on exam performance, violations, and crashes. Among the participants who attended DE (N = 1,536), the importance of the insurance discount in their motivation to attend DE was studied in relation to violation and crash records during the first 450 days of unsupervised driving and explanatory variables from the questionnaire.

Results: Insurance-motivated participants, compared to those who were not motivated by the insurance discount, were more likely to have: greater violation risk, more tolerant attitudes towards speeding and risk taking, and less financial support from family for all licensing and driving related expenses. Insurance motivation was also associated with the likelihood of presenting fraudulent DE certificates and expressing a willingness to defraud insurance companies.

Discussion: Increased violation and crash risk associated with insurance-motivation may possibly be due to greater *morale* hazard. The data also indicate that insurance motivation may be associated with greater *moral* hazard and potential future losses for insurers. Alternative methods for insuring adolescent drivers are suggested with the aim of decreasing insurance losses and injury risk by attempting to decrease both *morale* and *moral* hazard.

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ABSTRACT

Problem: The overrepresentation of adolescent drivers in crashes is a robust phenomenon. Driver education (DE) is a popular countermeasure, and in most North American jurisdictions, insurers grant automobile insurance premium discounts to DE graduates. However, over the past 20 years, evaluations have consistently demonstrated that DE does not reduce, and may even increase, crash risk among adolescent novice drivers. Providing premium reduction incentives to DE graduates may possibly increase crash risk in two ways. One, by reducing the overall cost of licensing and car ownership, insurance may increase driving exposure. Two, insurance may increase *morale hazard*, a careless attitude toward prevention. The human and financial losses resulting from adolescent crashes are a serious problem for public health and for insurers. Insurance is also known to increase *moral hazard*, a tendency to make dishonest claims – losses due to fraud are a significant problem for insurers. Therefore, the DE insurance discount may not be optimally efficient for reducing insurers' losses or for improving the public health. One approach to investigating the effects of the DE insurance discount is to study the characteristics and the driving records of adolescents who are insurance-motivated, i.e. those who attend DE partly or entirely for the insurance discount.

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Discussion: Increased violation and crash risk associated with insurance-motivation may possibly be due to greater morale hazard. The data also indicate that insurance-motivation may be associated with greater moral hazard and potential future losses for insurers. Alternative methods for insuring adolescent drivers are suggested with the aim of decreasing insurance losses and injury risk by attempting to decrease both morale and moral hazard.

Keywords: Adolescent drivers, driver education, crashes, insurance, morale hazard, moral hazard, risk taking.

RESUME

Problème : La surreprésentation des conducteurs automobiles adolescents impliqués dans des collisions est un phénomène robuste. L'éducation routière (ER) est une intervention populaire et, dans la plupart des juridictions Nord Américaines, plusieurs assureurs donnent des rabais sur les primes d'assurances automobiles aux nouveaux conducteurs ou conductrices qui présentent une attestation de complétion d'un cours de conduite. Cependant, depuis 20 ans, les études ont démontré que le fait de suivre un cours de conduite ne réduit pas, et même pourrait augmenter le risque d'être impliqué dans une collision chez les jeunes conducteurs. Les rabais sur les primes d'assurances automobiles pour les nouveaux conducteurs ou conductrices avec des attestations ER peuvent augmenter leur risque d'être impliqués dans une collision principalement pour deux raisons. Un, en réduisant le coût total d'obtenir un permis de conduire et de devenir propriétaire d'une voiture, le rabais d'assurance pourrait augmenter l'exposition au risque. Deux, l'assurance peut augmenter le risque d'une attitude négligente envers la prévention. Les pertes humaines et financières provoquées par les collisions routières impliquant des jeunes conducteurs et conductrices posent un grave problème pour la santé publique et les assureurs. Il est aussi connu que l'assurance peut augmenter le risque moral, une tendance à faire de fausses réclamations – les pertes provoquées par les fausses réclamations sont un problème important pour les assureurs. Par conséquent, le rabais ER n'a pas nécessairement une efficacité optimale pour réduire les pertes des assureurs ou pour améliorer la santé publique. Une approche pour évaluer les effets du rabais ER est d'étudier les caractéristiques et le bilan routier des nouveaux conducteurs et conductrices qui étaient motivés à suivre un cours de conduite partiellement ou complètement dans le but d'obtenir un rabais d'assurance.

Méthode : Une cohorte de 1 804 nouveaux conducteurs et conductrices ayant moins de vingt ans a répondu à 149 questions réparties sur trois volets : les méthodes d'apprentissage de la conduite automobile, incluant les motivations pour suivre ou non un cours de conduite, la propension à prendre des risques, et le style de vie. La SAAQ a fourni les dossiers de conduite, et toutes les données ont été anonymisées et jumelées aux fins

d'analyse. Pour les participants qui ont suivi un cours de conduite (N = 1536), le niveau d'importance accordé au rabais d'assurance a été étudié et sa relation avec leurs bilans routiers pendant les 450 premiers jours de conduite sans supervision ainsi qu'avec d'autres variables explicatives du questionnaire.

Résultats : Les participants motivés par un rabais d'assurance, relativement aux participants non motivés par un rabais d'assurance, avaient plus de chance d'avoir plus d'infractions de la route, des attitudes plus tolérantes envers la conduite à haute vitesse et la prise de risque, moins de support financier de la part de leur famille pour les coûts associés à l'obtention du permis de conduire et les autres dépenses reliées à la conduite. La motivation au rabais d'assurance était aussi associée avec une probabilité plus élevée de présenter des attestations erronées de complétion d'un cours de conduite et d'exprimer une volonté de pratiquer un acte de fraude à l'égard des compagnies d'assurances.

Discussion : Le risque plus élevé d'avoir des infractions et des collisions qui est associé avec la motivation d'obtenir un rabais d'assurance pourrait être expliqué par une attitude négligente pour la prévention. Les résultats indiquent aussi que la motivation pour un rabais d'assurance peut être associée avec un risque moral plus grand et le potentiel de pertes pour les assureurs dans l'avenir. Quelques politiques d'assurances alternatives pour diminuer les attitudes négligentes et le risque moral sont suggérées dans le but de réduire les pertes pour les assureurs et le risque de collision.

Mots-clés : Conducteurs(trices) adolescent(e)s, éducation routière, taux de collisions, assurance, attitude négligente, risque moral, prise de risque.

I. INTRODUCTION

The overrepresentation of adolescent drivers, aged 16 to 19, in crashes is a robust phenomenon (Evans, 1991), and the leading cause of death for this age group in high-income countries (WHO, 1999). Driver education (DE) is a popular countermeasure against the adolescent driver crashes, and in most North American jurisdictions, insurers grant premium discounts for automobile insurance to DE graduates. From a public health perspective, incentives to attend DE are problematic - not only is there little or no evidence that DE improves adolescent driver safety (Achara, et al., 2001; Evans, 1991; Mayhew, Simpson, William, and Ferguson, 1998; Potvin, Champagne, and Laberge-Nadeau, 1988), but research indicates that adolescent crashes *increase* when DE expedites licensing (Boase and Tasco, 1997, Mayhew, Simpson, Desmond, and Williams, 2003; Ulmer, Preusser, Ferguson, and Williams, 1999; Wiggins, 2004). Providing insurance premium reduction incentives to DE graduates may possibly increase adolescent crash risk in two ways. One, by reducing the overall cost of licensing and car insurance for adolescents, the insurance discount may increase driving exposure, i.e., greater numbers of novice adolescent drivers with greater access to cars. Two, within the adolescent driver population, less expensive insurance may increase *morale hazard*, a careless attitude toward prevention (Vaughan and Vaughan,

1999). Morale hazard is inherent to insurance for drivers of all ages, but this condition may possibly be intensified by the immaturity and risk-taking lifestyles inherent to the adolescent stage of life. The human and financial losses resulting from adolescent crashes are a serious problem for public health and for insurers.

Insurance is also known to increase *moral hazard*, a tendency to make dishonest claims and a significant source of loss to insurers (Boyer and Dionne, 1997). In addition to the normal risk of fraudulent claims, there is a second potential manifestation of a form of moral hazard in relation to adolescent novice drivers – the falsification of the DE certificate itself. Licensing authorities in 44 of the 62 jurisdictions in North America allow DE certificates to be redeemed for a time-discount - a time-discount allows DE graduates to drive unsupervised several months earlier than permit candidates without DE (Insurance Institute of Highway Safety, 2003). The combined benefits of lower insurance costs and faster licensing endow the DE certificate with a certain “street value.” Government driver permit road exams tend to only test minimal knowledge and skills (Hirsch et al., 1999) and market forces in the highly competitive and difficult to regulate driving school industry keep tuition fees and profit margins low - these two conditions, in addition to its street value, favor trade in fraudulent DE certificates. Investigative journalists using a hidden camera uncovered evidence of the easy availability of fraudulent DE certificates – seven of eight driving schools visited in Montreal were prepared to sell the undercover reporter a DE certificate after taking fewer than the required number of practical driving lessons (Campbell, 1995). Therefore, it appears that the DE insurance discount may not be optimally efficient either for improving public health or for reducing insurers’ losses. One approach to investigating the effects of the DE insurance discount on adolescent crashes is to study the characteristics and the driving records of adolescents who are insurance-motivated, i.e. those who attend DE partly or entirely for the insurance discount.

This article examines three related hypotheses. Hypothesis 1: Adolescents who are insurance-motivated, i.e. those who attend DE partly or entirely for the insurance discount, are different than those not motivated by insurance in ways that may influence violation and crash risk. Hypothesis 2: Insurance-motivation may be associated with higher violation and crash rates, a potential indicator of increased morale hazard. Hypothesis 3: Insurance-motivation may be associated with increased moral hazard, as indicated by potential fraud in relation to obtaining DE certificates or an expressed willingness to defraud insurance companies. These three hypotheses were tested using data from a prospective cohort study of novice drivers aged 16

to 19 in Quebec that linked together individual data from two sources: an extensive questionnaire on learning methods, risk taking, and lifestyles completed at the time of licensing, and; government records of driver's permit exam performance and rates of violations and crashes for the first 450 days of unsupervised driving. Personal data were anonymized with a dummy number prior to analysis.

This article is organized as follows. Section 2 describes the research methods. Section 3 presents the results of the analyses according to the three hypotheses, beginning with an explanation of how motivation to attend DE was measured. In section 4, these results are discussed in relation to recommendations for insuring adolescent drivers in ways that discourage both morale and moral hazard.

2. METHOD

Design

A prospective cohort design was used to study differences in first year violation and crash rates between newly licensed Quebec drivers under 20 years of age who attended and who did not attend DE. From June to September 2000, a questionnaire, available in French and English, was distributed with the collaboration of the Société de l'assurance automobile du Québec (SAAQ) at three permit exam centers in and around Montreal by trained, bilingual volunteers supervised by researchers from the Center for Research on Transportation (CRT) of the Université de Montréal. Probationary permit candidates who had just passed their road exams were asked to complete a lengthy questionnaire. An incentive was offered in the form of a lottery for one of 33 available \$100 prizes. Each participant, and in the case of minors, a parent or guardian, signed a consent form allowing researchers to access future driving records.

Participants

Of the initial 2,134 participants who completed a questionnaire, 1,804, (818 female), met the essential study criterion of providing signed legal consent allowing access to future driving records. Ten participants, four female, were coded as 19-year olds although they were between eleven days and five months past their 20th birthday. The mean age of the total sample for both females and males is 17.9. However, within the sample, the mean ages of probationary licensing

vary according to DE attendance or non-attendance. Table 1 shows that 85% of the total sample, or 1,536 study participants, 723 female, attended DE and that DE attendance lowers the mean age of probationary licensing for females and males by approximately six months. For the purposes of this article, analyses were performed on the 1,536 study participants who attended DE.

**TABLE 1
SAMPLE SIZE AND MEAN AGE OF STUDY
POPULATION ACCORDING TO DE ATTENDANCE
CONTROLLING FOR SEX**

DE attendance	n	Females		Males	
		Mean age	n	Mean age	n
Yes	1,536	17.95	723	17.83	813
No	268	18.46	95	18.31	173
Total	1,804	18.01	818	17.91	986

Data sources

Between June 2000 and April 2003, data were collected from two principal sources: the questionnaire, and files from the SAAQ. In September 2003, the SAAQ merged the data from both sources using a dummy number in order to exclude all identity markers other than age and sex before returning the complete file to the researchers for analysis.

The questionnaire contains 149-items organized into three sections. The first section collects information about the process of learning how to drive, e.g. experience before the learner's permit with non-motorized and motorized vehicles, DE or no DE, hours of supervised driving practice, self-rated learning and driving abilities. The second section consists of psychometric measures of risk taking associated with increased collision risk. The last section collects information about family backgrounds and lifestyles, i.e. residence, parental education and occupation, lifestyle habits, academic performance, and expectations about car ownership and driving patterns. The life style habits questionnaire was derived from the work of Shope, Waller, Raghunathan, and Patil (2001). The questionnaire was distributed at the start of the probationary period, to collect retrospective data about the previous two periods in the licensing

process, e.g. methods used to prepare for the SAAQ learner's and the probationary exams, as well as prospective data about anticipated driving exposure during the probationary permit period.

The second source of data is the drivers' records from the SAAQ files. The SAAQ is a governmental agency that insures all residents of Quebec for injuries sustained in collisions with a motor vehicle and has a mandate to improve road safety. The SAAQ administers driver licensing, motor vehicle registration, the demerit point system of violations and suspensions, and receives all police reports on collisions. A driver's record contains the dates and details about permit exam performances (theory and road), demerit point infractions, permit suspensions and revocations, and police-reported crashes. The data from the SAAQ were obtained for the entire study population until the end of December 2001 and included the participants' complete history to the end of the first 450 days of holding a probationary permit. Minor property damage only crashes that parties settle between themselves with the insurers' joint report are not recorded by the SAAQ.

Analyses

The longest observation period available for all the participants with their first probationary license is 450 days, and the violation rates and crash rates that serve as outcome measure of safety in this study are always based on that time period. Analyses were done separately by sex because the results of chi-square tests ($p < .001$) confirmed the well-established sex differential – the rates of violations per 100 female and male participants were 12.7 and 34.2 respectively, and the rates of crashes per 100 female and male participants were 5.7 and 12.9 respectively – and because proportionately more females than males attended DE ($p < .001$) and succeeded on the first attempt at the theory exam ($p < .01$). Age is generally analyzed according to two-year age groups, 16-17 vs. 18-19, because statistically significant decreases in violation rates were observed for males as age increased and because these two age groupings are of approximately equal proportional size.

Explanatory variables from the questionnaire and violations and crashes were cross tabulated with the outcome of interest for this article - insurance motivation to attend DE. Motivation to attend DE for the time-discount is also important and is analyzed in Hirsch, Maag, and Nadeau (in press). Discrepancies may appear when summing the counts for some variables because some participants did not answer every question. Binary logistic regression models were constructed for the outcomes of interest mentioned above using all

the available pertinent variables. Variables in the final models were only included if they yielded a significant odds ratio for at least one sex. Contingency tables are given for the most interesting associations. Unless otherwise indicated, all associations reported are statistically significant at 5% or less. Tables not presented here are available for consultation.

Limits and strengths

Participants were recruited from three licensing centers where over a period of approximately four months research assistants approached successful adolescent candidates for a probationary permit and requested that they complete the extensive questionnaire. For several reasons, it is difficult to determine the precise rate of participation in the study. Therefore, the potential exists for a selection bias that is inherent to all surveys. In general, however, participants who volunteer have characteristics that predispose them towards more socially acceptable behavior, so it is possible that any selection bias might exclude the riskier drivers from the study sample. One method for verifying this assumption is to compare the first year violation and crash rates of the sample, containing only first year probationary permit holders, with the violation and crash rates for the same time period of all first year probationary permit holders, matched for age and sex, in Quebec. Age- and sex-matched data on violations and crashes for the same time period in Quebec are available, however, the data combines all permit holders (learner's or probationary or class 5) and is not available only for first year probationary permit holders. Nevertheless, comparisons of violation and crash rates from the study data were made with the available Quebec data. Rates for one or more violations for 360 days per 100 drivers for females and males respectively were 10.2 and 27.4 for the study population and 14.8 and 49.4 in Quebec (Tardiff, 2003); rates for one or more crashes for 360 days per 100 drivers for females and males respectively were 4.6 and 10.32 for the study population and 8.2 and 14.6 in Québec (Société d'assurance automobile du Québec, 2004). It is possible, therefore, that any potential selection bias might be associated with an underestimation of the magnitude of some of the study findings related to risk taking and increased violation and crash risk. Due to budget limitations, direct measures of driving exposure could not be obtained.

This study has several strengths. First, the cohort design and extensive questionnaire allowed for the collection of retrospective data on driving-related experience prior to the start of unsupervised driving exposure as well as prospective data covering the first 450

days of unsupervised driving with a probationary permit. The inclusion of a signed consent form for access to driving records provided researchers with a full range of objective data about the participants including their performance on theory and road exams and all violations and police-reported crashes up to the first 450 days of unsupervised driving and prevented loss of data from participants who may have been reluctant to self-report violations and crashes after they occurred. The linkage between the questionnaire data and the anonymized driving records for each individual created a unique data base that allowed for a more detailed exploration of the learning and driving patterns of various adolescent driver subgroups.

3. RESULTS

The measurement of motivation to attend DE

Motivation to attend DE was measured in the following manner. All the study participants were asked to check off a maximum of three reasons for why they did or did not attend DE courses (see Table 2 for the list of reasons). Unfortunately, not all respondents followed the instructions; some went as far as to rank every possible reason listed. In order to analyze the data, only patterns consistent with the instruction (maximum three reasons) were accepted, meaning: (i) one first reason and one second reason and one third reason, (ii) one first reason and one second reason and nothing else, (iii) one first reason and nothing else. The motivation question yielded 1,293 acceptable answers, 208 unacceptable ones and 35 non-responses for a total of 1,536 who had taken a course.

Table 2 shows that, overall, the most frequent reasons given for going to a driving school were to be well prepared to pass the practical driver's license exam, to learn how to drive, to save 4 months on the learning period, and to save money on automobile insurance. To test the first hypothesis, that insurance-motivated DE students are different from those who are not insurance-motivated, a binary variable was created - every participant who mentioned insurance as a first, second, or third choice was coded as 1, and participants who did not mention insurance at all were coded as 2.

TABLE 2
RANKING OF MOTIVES FOR ATTENDING DE

Motives for attending DE	Firsts	Seconds	Thirds	Total	Rank
a: To learn how to drive	560	274	119	953	2
b: To buy a car	8	38	59	105	6
c: To be well prepared for practical exam	412	465	171	1,048	1
d: To save 4 months on learning period	179	215	294	688	3
e: To save money on car insurance	74	185	289	548	4
f: Due to lack of access to an automobile	14	26	56	96	7
g: Due to lack of a driver to accompany me	11	24	64	99	8
h: Because parents desired it	27	39	108	174	5

Hypothesis 1: Insurance-motivated adolescents are different

In the study sample, more females (88.4%) than males (82.5%) attended DE. In Quebec, DE is defined as a minimum of 12 hours of practical lessons. For both sexes, DE attendance was associated with being 16- to 17-years old, having fewer than 25 hours of supervised driving practice during the learner's permit period, and receiving full financial support from family for the purchase of a vehicle. For females, DE non-attendance was associated with having between 25 and 50 hours of supervised practice. For males, DE non-attendance was associated with having unsupervised driving experience before the learner's permit, and working or seeking to work full time. A report based on this research did not find any association, for either sex, between DE attendance and any of the psychometric scales measuring attitude to risk (Maag, Laberge-Nadeau, and Hirsch, 2004). Further cross-tabulations did not find associations between DE attendance and academic performance (grades or time spent doing homework or academic ambition), or residence (city or suburbs), or family stability, as reflected by living with both parents compared to only one.

Table 3 shows the sex and age distribution of the insurance-motivation variable. Notice that only 29.2 % of the female participants were insurance-motivated compared with 54.7% of the male participants. Therefore, whenever possible, analyses are done separately by sex. For males, insurance-motivation versus no insurance-

motivation is relatively stable across age groups. For females, insurance-motivation is proportionately greater at ages 16 and 18, but still far lower than for males.

TABLE 3
SEX AND AGE DISTRIBUTION OF
INSURANCE-MOTIVATION VARIABLE

Sex	Insurance-motivation	n	% within sex	Age at Probationary Permit			
				16 (% within group)	17 (% within group)	18 (% within group)	19 (% within group)
F*	Yes	182	29.2	34.3	21.9	35.8	28.6
	Not mentioned	442	70.8	65.7	78.1	64.2	71.4
M	Yes	366	54.7	55.7	55.8	51.9	54.9
	Not mentioned	303	45.3	44.3	44.2	48.1	45.1

2 with 3 df, * p < .05

Cross tabulations between insurance-motivation and age found no differences within each age group. Cross tabulations between insurance-motivation and variables from the questionnaire indicate several differences that might be related to increased morale hazard. All the analyses were done controlling for sex. The differences are reported in the order of the three sections of the questionnaire, learning methods, risk-taking measures, and lifestyles.

Learning method differences and insurance-motivation.

Insurance-motivated females, compared to females who were not motivated by the insurance discount, were more likely to have had experience, before the learner's permit, driving without supervision on private-roads (27.5 vs. 19.7%). Insurance-motivated males, compared to males who were not motivated by the insurance discount, were more likely to find driving easy to learn (55.1 vs. 45.5%), to have driven before their first driving lesson (75.7 vs. 65.6%), and, during the learner's permit, to have over 50 hours of supervised driving practice, excluding driving lessons (30.4 vs. 22.8%). In a previous analysis of this study sample, Hirsch, Maag, and Nadeau (in press) found that over 50 hours of practice during the learner's permit was associated, for males, with higher rates of violations, and with

higher rates of crashes controlling for the influence of violations – this counterintuitive result may be due to the possibility that more practice during the learner's permit might be associated with more driving exposure with the probationary permit.

Risk-taking measures and insurance-motivation.

Table 4 shows that insurance-motivation is associated with two psychometric scales of risk taking. The first measure is a scale of attitudes towards driving violations (ADVS) developed by West and Hall (1997) that elicits opinions about speeding under different conditions, e.g. on expressways, and penalties against speeding, e.g. greater severity, using a four-point Likert scale, (completely agree, moderately agree, moderately disagree, completely disagree). Participants with higher scores, indicating riskier attitudes, on the ADVS have an increased probability (OR 1.34) of attending DE for insurance reasons, after controlling for the influences of age and sex.

**TABLE 4
A BINARY-LOGISTIC REGRESSION MODEL FOR
INSURANCE-MOTIVATION WITH RISK-TAKING
MEASURES, AGE, AND SEX AS EXPLANATORY
VARIABLES**

Predictor variables	n = 1,293	
	OR	95% CI
Sex		
Male	1.54 ***	1.36-1.74
Female	Reference group	
Age		
16-17	1.07	0.95-1.21
18-19	Reference group	
Attitude towards driving violations (ADVS) [†]	1.34 ***	1.18-1.51
General risk taking (GRQ) [†]	1.27 ***	1.12-1.45
*** p < .01		
† Higher scores indicate riskier attitudes		

The second measure of risk taking reported in Table 4 is a general risk questionnaire (GRQ) developed by the authors that focuses on perceptions of the level of risk inherent to certain activities, e.g. cycling without a helmet, sex without condoms, bungee jumping, using a five-point Likert scale, (very safe, safe, neutral, dangerous, very dangerous). Participants with higher scores, indicating riskier attitudes, on the GRQ have an increased probability (OR 1.27) of attending DE for insurance reasons, after controlling for the influences of age and sex.

Two binary regression models (not shown) done separately by sex show that: 1) for females, a higher score on the ADVS is associated with a higher probability of having one or more violations during the first 450 days of driving with a probationary permit (OR 1.43), and; 2) for males, a higher score on the GRQ is associated with a higher probability of having one or more crashes during the first 450 days of driving with a probationary permit (OR 1.28). Separate cross tabulations (not shown) show that, for males, insurance motivation is associated with a greater probability of perceiving it to be safe or neutral, versus risky, to accept a ride with a fast driver, drive on snow-covered roads, and drive fast on expressways.

Lifestyle and insurance motivation.

Table 5 shows that insurance-motivation is associated with doing an average of less than one hour of homework daily, 42.2% and 59.4% respectively for females and males. The homework time variable offers a possible explanation or mechanism for attitudes that might influence driving exposure and crash risk. Cross tabulations with the entire sample (Hirsch, 2005) revealed that, for both sexes, reporting less than one hour of homework daily was positively associated with: 1) smoking cigarettes almost daily; 2) having all or most of one's friends as smokers; 3) drinking alcohol more frequently; 4) having less ambition to go to university and graduate school; 5) not living with both parents; 6) expecting to have access to vehicles always; 7) expecting to drive for no special reason on weekday nights and weekend nights, and; higher violation rates. For males only, reporting less than one hour of homework daily was also positively associated with higher crash rates.

**TABLE 5
HOMEWORK TIME BY INSURANCE-MOTIVATION
AND SEX**

Sex	Insurance-motivation	n	Daily average of 1 hour or less spent doing homework (% within group)
F *	Yes	166	42.2
	Not mentioned	389	31.9
M *	Yes	308	59.4
	Not mentioned	259	48.6

* p < .05

For females only, insurance motivation is associated with living in the suburbs versus the city and reporting that a family member or friend had been injured in a traffic crash. Familiarity with road injury victims is associated with higher (riskier) scores on scales measuring social deviance, e.g. dishonest behavior, and crash-susceptibility, a sense of vulnerability in relation to common crash types, e.g. rear-end crash, intersection crash (Hirsch, 2005). For males only, insurance-motivation is associated with presently owning or soon planning to own a car and receiving no family financial support to pay for probationary permit fees, DE tuition, car insurance premiums, car purchase, gasoline, and repair costs. Further cross-tabulations (not shown) did not find any association between male insurance-motivation and any marker of socio-economic status, i.e. number of cars at home, residence, highest level of parental education.

Hypothesis 2: Insurance-motivation, morale hazard, and crash risk

Table 6 shows that insurance-motivation for attending DE is associated with higher violation rates for 16- to 17-year old males compared with 18- to 19-year old males, 42.5 to 26.1 respectively. The higher crash rate for 16- to 17-year old males is not statistically significant and the violation and crash rates for 18- to 19-year old males are not differentiated by insurance-motivation. For females, no associations were found between insurance-motivation and violations and crashes.

TABLE 6
VIOLATIONS AND CRASHES PER 100 MALE
DRIVERS FOR THE FIRST 450 DAYS OF THE
PROBATIONARY PERMIT BY INSURANCE-
MOTIVATED DE ATTENDANCE AND AGE

Age-group	Insurance-motivation	n	One or more violations per 100 drivers (% per group)	One or more crashes per 100 drivers (% per group)
16-17	Yes	228	42.5 *	14.5
	Not mentioned	181	30.4	9.9
18-19	Yes	138	26.1	10.9
	Not mentioned	122	24.6	10.7

* p < .05

Hypothesis 3: Insurance-motivation, moral hazard, and potential fraud

There are two types of fraud associated with insurance-motivation that are potentially indicated by the data in this study. One relates to the possibility that fraudulent DE certificates are purchased from driving schools. The other type of fraud relates to the increased potential for false or exaggerated claims in the future by the insurance-motivated participants relative to participants not motivated to attend DE for insurance reasons. First, we examine potential fraud related to the DE certificate.

Referring back to Table 2, one observes that 53.2% of the participants included the motivation to license faster as one of their top three reasons for attending DE, and 42.3% of the participants included the motivation to earn an insurance discount as one of their top three reasons for attending DE. The following analysis indicates that some of the insurance-motivated participants may have presented fraudulent DE certificates. Among the 1,293 participants who gave valid responses explaining why they attended DE, 75.8% of the participants reported taking exactly 12 hours of lessons, 13.2% reported more than 12, and 10.5%, or 136 participants of both sexes reported taking fewer than the 12 hours of lessons required for a DE certificate. Among the last subgroup of 136 participants, 86 passed the probationary permit exam, according to objective data from the

SAAQ, before 12 months had expired on their learner's permits. Either this subgroup of 86 incorrectly answered the questionnaire or, at the time of the probationary permit road exam, this subgroup presented the SAAQ with DE certificates for the legally required minimum of 12 hours of practical driving lessons that overrepresented the number of practical lessons actually taken. Arguably, reporting more lessons than were actually taken could be viewed as a form of fraud. Assuming potential fraud, further investigations were made.

For convenience, the 86 study participants are called the "less-than-12" group because each participant took less than 12 lessons and less than 12 months to acquire a probationary permit. The remaining 1,207 study participants are called the "12-or-more" subgroup because each participant either took a minimum of 12 lessons or took no lessons and waited the minimum of 12 months to obtain probationary permits. The two subgroups are compared, combining the sexes due to small numbers, in relation to their respective driving records. Table 7 shows that the insurance-motivation is associated with membership in the less-than-12 subgroup. Table 8 shows that the violation rates for the less-than-12 subgroup compared to the 12-or-more subgroup were 34.9 to 21.7 respectively. The crash rate for the less-than-12 subgroup compared to the 12-or-more subgroup was 14.0 to 8.4 respectively. The association for crashes is not statistically significant in Table 8; however, in an identical analysis using the full study sample of 1,804 participants, the increased crash risk of the less-than-12 subgroup compared to 12-or-more subgroup almost reached statistical significance (Hirsch, Maag, and Nadeau, in press).

TABLE 7
DE LESSON GROUP MEMBERSHIP (LESS-THAN-12
OR 12-OR-MORE) BY INSURANCE-MOTIVATION

Motivation to attend DE for insurance discount	n	DE lesson subgroup **	
		12-or-more (% within group)	less- than-12 (% within group)
Yes	548	90.9	9.1
Not mentioned	745	95.2	4.8
** p < .01			

TABLE 8
RATES OF ONE OR MORE VIOLATIONS OR
CRASHES DURING FIRST 450 DAYS COMPARING
THE LESS-THAN-12 AND THE 12-OR-MORE
DE LESSON SUBGROUPS

DE lesson subgroup	n	One or more violations ** (% within group)	One or more crashes (% within group)
Less-than-12	86	34.9	14.0
12-or-more	1,207	21.7	8.4
** p < .01			

Table 9 shows that the highest violation and crash rates, 44.0 and 20.0 respectively, belong to participants who attended DE for insurance-motivation and who allegedly presented the licensing authorities with a fraudulent DE certificate, and that the lowest rates violation and crash rates belong to participants who did not mention the insurance discount as one of their reasons for attending DE.

TABLE 9
RATES OF ONE OF MORE VIOLATIONS AND
ONE OR MORE CRASHES BY DE LESSON GROUP
MEMBERSHIP AND INSURANCE-MOTIVATION

Insurance-motivation	DE lesson group	n	One or more violations (% within group)	One or more crashes (% within group)
Yes	Less-than-12	50	44.0 *	20.0 †
	12-or-more	498	26.9	10.2
Not mentioned	Less-than-12	36	22.2	5.6
	12-or-more	709	18.1	7.1
* p < .05; † p < .10				

Table 10 and Table 11 show the associations between certain socially deviant behaviors and insurance-motivation controlling for sex and age. The younger, insurance-motivated males and the older, insurance-motivated females report a greater probability of not paying for a bus ride. The younger insurance-motivated males and females report a greater probability of not paying taxes on salary. The older insurance-motivated males report a greater probability of shoplifting and the younger insurance-motivated males report a greater probability of defrauding an insurance company.

TABLE 10
SOCIAL DEVIANCE BY INSURANCE-MOTIVATION,
FOR FEMALES, CONTROLLING FOR AGE

If certain to get away with it, declared it very to quite likely (vs. not at all likely) to:	Insurance-motivation	Female			
		n	16 to 17 years (% of group)	n	18 to 19 years (% of group)
Take public transport without paying	Yes	94	48.9	85	61.2 *
	Not mentioned	261	52.9	176	45.5
Receive a salary without paying taxes	Yes	95	76.8 *	84	71.4
	Not mentioned	262	63.4	176	60.2

* p < .05

TABLE II
SOCIAL DEVIANCE BY INSURANCE-MOTIVATION,
FOR MALES, CONTROLLING FOR AGE

If certain to get away with it, declared it very to quite likely (vs. not at all likely) to:	Insurance-motivation	Male			
		n	16 to 17 years (% of group)	n	18 to 19 years (% of group)
Take public transport without paying	Yes	224	58.5 **	134	62.7
	Not mentioned	181	45.3	120	51.7
Receive a salary without paying taxes	Yes	226	73.0 *	137	66.4
	Not mentioned	181	63.5	118	57.6
Shoplift	Yes	226	17.4	134	22.4 *
	Not mentioned	181	17.7	120	12.5
Defraud an insurance company	Yes	225	23.6 *	136	25.7
	Not mentioned	181	15.5	118	16.1

* $p < .05$; ** $p < .01$

4. DISCUSSION

The study data lend varying degrees of support to the three hypotheses of this research article. Hypothesis 1, that participants motivated partially or entirely to attend DE for the insurance-discount are different from participants who did not mention insurance as one of their reasons for attending DE, finds some support from items tested in all three sections of the questionnaire, learning methods, risk-taking measures, and lifestyles. Insurance-motivated females tend to be slightly older when they license and appear to have more experience before the learner's permit driving without supervision. Insurance-motivated males tend to be slightly younger when they license and appear to have greater facility learning how to drive and more hours of supervised driving practice with a learner's permit. Insurance-motivation is associated, for females, with a greater tendency to disagree with speed limits and stricter penalties for speed

violations and, for males, with a greater tendency to perceive high-risk activities, e.g. unprotected sex, bungee jumping, as safe or neutral versus risky. Lower risk perceptions for high-risk activities may be related to multiple factors. For example, sensation seeking has been identified as a biological drive that peaks between 16 and 19 years of age (Zuckerman, 1994) and that has been associated with increased violation and crash risk in several studies (Jonah, 1997). Other potentially covarying explanations for the lower risk perceptions and the increased crash risk of adolescent drivers are biopsychosocial immaturity, sex, and driver inexperience (Ferguson, 2003; Mayhew and Simpson, 1990). The wide range of possible explanations for the increased crash risk of adolescents and the difficulty in reducing their risk after unsupervised driving is permitted is arguably what makes the supporting evidence for Hypothesis 1 more interesting, particularly for insurers – it appears that adolescent drivers who attend DE for the insurance discount may be more likely to drive at higher speeds and take more risks than adolescents who attend DE for other reasons.

Insurance-motivation is also associated with spending, on average, less than one hour on homework daily – in a previous analysis of the entire sample population (Hirsch, Maag, and Nadeau, *in press*), less than one hour spent on homework was associated, for both sexes, with several risky behaviors that potentially increase the quantity of risky driving exposure, e.g. night driving, and decrease the safe driving during that exposure, e.g. alcohol, driving for not special reason. In addition, an analysis with all the males in the sample found that less than one hour spent on homework was associated with higher crash rates. Insurance-motivation was associated for females with living in the suburbs versus the city and with knowing a family member or a friend who had been injured in a traffic crash. Hirsch, Maag, and Nadeau (*in press*) report on several studies that have found associations between risky driving records or habits of family members or friends and similar risky driving records for novice adolescent drivers; most interestingly, knowing a family member or a friend who has been a victim of road injury has also been found to predict injury involvement for adolescent drivers. Insurance-motivation was associated, for males, with already owning or planning to own a car and with receiving no financial assistance from family for any of the costs relating to driving, from permit fees to gasoline. Lack of family financial support appears to partially explain the attractiveness of the insurance-discount for this subgroup of young male drivers; however, lack of family financial support does not appear to be associated with lower socio-economic status, i.e. number of cars at home, residence, highest level of parental education. One might speculate

that different family dynamics may account for different levels of financial support, e.g. greater value on independence, and that such values might also be associated with less parental supervision. Less parental supervision has been associated with higher crash risk for adolescent drivers (Hartos, Eitel, and Simons-Morton, 2001).

Hypothesis 2 states that insurance motivation may be associated with higher violation and crash rates, a potential indicator of increased morale hazard. The study data did find an increased risk of violations for the youngest insurance-motivated males – the crash rate of this subgroup also appeared to be higher but not at a level of statistical significance. Given the well-established association between violation rates and crash risk, one might speculate that an analysis with a larger sample may find an association between insurance-motivation and crashes for males. Female violation and crash rates tend to be lower, and no association was found in this study with insurance motivation.

The study data also lend some support to Hypothesis 3, that insurance-motivation may be associated with increased moral hazard, as indicated by potential fraud in relation to obtaining DE certificates or an expressed willingness to defraud insurance companies. Insurance-motivated participants who were more likely to present allegedly fraudulent DE certificates have a self-reported greater probability of: cheating the public transit system and avoiding income taxes, for both sexes, and shoplifting and defrauding insurance companies, for males. It is also worth noting, but perhaps not surprising, that moral hazard may also be associated with increased morale hazard – insurance-motivated participants who allegedly presented fraudulent certificates have a higher violation rate and a non-significantly higher crash rate as well.

In summary, the subgroup that attends DE for the insurance discount appears to represent a greater risk of violations and crashes, potentially due to greater morale hazard. The insurance-motivated subgroup also appears to represent a greater risk of moral hazard based on their current alleged use of fraudulent DE certificates, and for males, a greater self-reported willingness to defraud insurance companies. Naturally, the high-risk individuals in the insurance-motivated subgroup have no incentive to reveal their true risk, which is costly for insurers to observe. Insurers pool risks, in part because they are unable to differentiate between risk types - however, a policy such as the DE insurance discount tends to equalize rather than to differentiate premiums, effectively redistributing income from adolescent drivers with low crash risk, who did not attend DE for the

insurance discount, to those with higher crash risk, who attended DE partially or entirely for the insurance discount. Therefore, in answer to the question contained in the title of this article, insurers who grant premium discounts to DE graduates appear to be attracting and rewarding bad risks.

Based on the findings in this study, three alternative, complementary methods for insuring adolescent drivers are suggested. One, the insurance discount to attend DE should be reevaluated and possibly discontinued. Discontinuing the insurance discount for DE graduates may potentially help reduce morale hazard and increase safer driving. Given that driving, especially in North America, is essential transportation for almost all citizens, it is highly unlikely that the adolescent driver insurance market would decrease if adolescents were not given incentives to attend DE. Ironically, discontinuing incentives to attend DE, i.e. insurance- and time-discounts, might possibly improve the ability of conscientious driving school owners to develop and deliver more effective DE courses by eliminating the street value of fraudulent DE certificates and the profitability of unprofessional conduct and unfair competition by some driving school owners. Several researchers have already recommended discontinuing the DE time-discounts (Maag, Laberge-Nadeau, and Hirsch, 2004; Mayhew, Simpson, Desmond, and Williams, 2003; Wiggins, 2004).

Two, at the outset of the life-long relationship between insurers and automobile owners/drivers, insurers can develop policies that clarify and reinforce the bonus malus approach for setting automobile insurance rates, rather than reward adolescents for merely attending DE before they have actually demonstrated any safe driving behavior. For example, the Alberta Motor Association rewards novice adolescent male drivers with fewer than 2 demerit points and no at-fault crashes with \$350 every six-months for three years, and the Co-operators grant novice adolescent male drivers one-year of free liability insurance after three-years of safe driving (Ogle, 1998). Three, in light of the research that demonstrates an association between parental driving records and the records of their adolescent children (see Hirsch, Maag and Nadeau, in press), insurers might also consider linking parental and adolescent driving records together in a single policy designed to encourage parents to be better role models in their own driving behavior and to exercise greater participation in the training and greater supervision of the driving of their adolescent children – Beck, Hartos, and Simons-Morton (2002) note that parental involvement can significantly reduce adolescent driver crash risk.

5. CONCLUSION

Ideally, the role of DE is to help produce safer adolescent drivers. More than two decades of research has failed to validate the safety benefits of DE for adolescent drivers and the data in this study indicate the possibility that adolescents who attend DE for insurance reasons may represent a greater loss for insurers in both the short and long term. Given the necessity of driving and insuring motor vehicles, eliminating the DE insurance discount incentive is unlikely to reduce the number of adolescents who license or who purchase vehicles. Alternative insurance rating systems that reward novice drivers for their safe driving might reduce losses due to actual and fraudulent claims. Reducing actual claims could also reduce injury and benefit society. As Vaughan and Vaughan (1999) observe, although loss-prevention activities are not essentially a part of the operation of the insurance principle, in many forms of property and casualty insurance, attempts to reduce losses are perhaps the most important feature of all.

**APPENDIX
REASONS FOR ATTENDANCE TO DE**

What were your reasons for deciding to go to a driving school? The first reason being the most important. (Maximum three reasons.)

	1st	2nd	3rd
To learn how to drive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To buy a car.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To be well prepared for the practical driver's license exam.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To save four-months on the learning period.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Due to lack of access to an automobile driver.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Due to lack of access to a driver to accompany me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To save money on automobile insurance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Because my parents wanted me to.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other reason: Please specify _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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