



An evaluation of Ontario's Group Education Session (GES) for license renewal of seniors aged 80 and above



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ABSTRACT

Introduction: In 1996, the Ministry of Transportation in Ontario (MTO) implemented the Group Education Session (GES), which is a mandatory license renewal program for drivers aged 80 and older. This study describes an evaluation of the GES to assess its impact on road safety in Ontario, as well as its effect on the safety of individual drivers who participated in the program. **Methods:** Time series analysis of senior driver records both before and after implementation of the GES, and logistic regression and survival analysis examining senior driver records prior to, and following, their participation in the GES. **Results:** Using time series analysis there is some evidence to suggest that the GES had a positive impact on road safety. According to the other analyses, participation in the GES is associated with a decrease in the odds of collisions and convictions, regardless of whether drivers pass their first attempt of the knowledge test or not. In addition, failing the first road test and/or having demerit points are strong indicators of future collision and conviction involvement. **Discussion:** Results from this evaluation suggest that the GES has had a protective effect on the safety of senior drivers. **Practical Applications:** The findings and discussion will help MTO improve the GES program and provide insights to other jurisdictions that have, or are considering, introducing new senior driver programs.

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1. Introduction

Canadians in their 80s are the fastest growing segment of the senior population and many seniors continue to drive into advanced age (Turcotte, 2012). In the future, there will be more seniors than ever before driving on Canada's roadways (Robertson & Vanlaar, 2008). These trends raise concern because many aspects of aging can have a detrimental effect on overall driving capability and driver safety (Eby, Trombley, Molnar, & Shope, 1998).

To better address the safety of senior drivers, the Ministry of Transportation in Ontario (MTO), in 1996, implemented the Group Education Session (GES), which is mandatory for drivers aged 80 and older as part of their license renewal requirements. These license renewal requirements are part of a two-year renewal cycle that required drivers aged 80 and older to pass vision and knowledge tests about road rules, be subject to a driver record review, and participate in a GES. This vision test, knowledge test, and driver record review take place in conjunction with the GES. The GESs are delivered by MTO Driver Improvement Counsellors (DICs) at 116 approved locations across the province. Seniors are encouraged to actively participate during the GES as their level of engagement is taken into consideration by DICs when they

make recommendations for referrals to a road test. Based on the combined results from the vision test, knowledge test, and driver record review, a DIC may refer a driver to a road test. If there are no concerns based on the combined results, the license can be renewed for another two years. If there are concerns, the senior will be referred to the road test that will ultimately be used to make final licensing decisions.

The GES takes approximately 90 min and is delivered to no more than 15 seniors at a time. The objective is to inform and educate senior drivers about rules of the road and road safety to help keep Ontario's roads safe. The GES is an interactive session that has a uniform curriculum. Topics covered during the course of this session include:

- updates on traffic rules and signs;
- strengths of older drivers;
- physical changes related to aging and how these changes affect driving;
- the effects of medications on driving;
- good practices to maintain driving fitness;
- driving situations that are high-risk for seniors;
- ways to reduce collision risk;
- the importance of self-awareness; and,
- alternatives to driving.

Before the introduction of the GES in 1996, MTO required all senior drivers aged 80 and over to go through the re-licensing process annually and complete a mandatory road test in addition to the above-mentioned vision and knowledge test. However, as of 1996, when the GES was first

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introduced, the re-licensing process was only required every two years. The vision and knowledge tests have remained in place, and the road test is no longer mandatory for all drivers but is instead reserved for those seniors where concerns are raised for a heightened risk of collision based on results from the vision test, knowledge test, driving record, and their participation in the GES.

In July 2005, another change was introduced. This time the GES was enhanced to improve the allocation of resources used in the program. This included an update of materials with more appropriate information to share with seniors, better visual design through the animation of traffic scenes, new vision testing equipment and projectors, and training for DICs on the delivery of the new curriculum (see also Vanlaar et al., 2014 for more information about the GES).

This study presents an evaluation of the GES within the entire context of license renewal requirements for drivers aged 80 and older to assess its impact on road safety in Ontario, as well as its effect on the safety of individual drivers who participated in the program. In regards to the safety effect on GES participants, the study focused on the following four research questions:

1. Is the safety of seniors who take the GES for the first time and pass the knowledge test on their first attempt different from the safety of seniors who take the GES for the first time and do not pass the knowledge test on their first attempt?
2. Is the safety of seniors who take the GES for the first time and have demerit points on their driver record different from the safety of seniors who take the GES for the first time and do not have demerit points?
3. Is the safety of seniors who are referred to the road test and pass it on their first attempt different from the safety of seniors who take the road test and do not pass it on their first attempt?
4. Is the safety of seniors who take the GES for the first time different from the safety of seniors of the same age who have not taken the GES?

The purpose of these research questions was as follows. The first three research questions focused on drivers who had participated in the GES. These were questions of interest because they provided insight into how different aspects of the context within which the GES takes place, like the knowledge test or the road test, as well as aspects of the GES itself were related to the safety performance of those who had participated in the GES. Any evidence produced by answering these first three research questions was used to formulate recommendations to improve the GES (e.g., by assessing the predictive value of the knowledge test and its usefulness as a tool that accompanies the GES). On the other hand, research question 4 examined causality by comparing senior drivers who had participated in the GES to senior drivers who had not participated in the GES. Answers to these questions were used to inform conclusions about the impact of the GES on the safety performance of senior drivers and help to formulate recommendations about the GES as a whole. In this regard, the study also examined evidence to determine if changes were needed in order to strengthen the effectiveness of the program.

2. Methods

Methods used include: time series analysis of senior driver records both before and after implementation of the GES; and logistic regression and survival analysis examining senior driver records prior to, and following, their participation in the GES. Senior driver records include information on crashes, convictions, and suspensions.

2.1. Time series analysis

Time series analysis was used to evaluate the impact of the GES on Ontario drivers aged 80 and older. In particular, ARIMA modeling in Stata was used to analyze monthly time series of crash data to see if the implementation of the GES in Ontario in October 1996 and the change to this

program in July 2005 have had a significant impact on crashes of Ontario drivers of at least 80 years of age. Annual data for every crash that occurred in Ontario were obtained from MTO for 1991 to 2010, inclusive. Data from these crashes were used to produce time series of monthly counts of drivers aged 80 years and older involved in crashes in Ontario between January 1991 and December 2010. The analysis focused on the following four different series of monthly counts of drivers in Ontario aged 80 years and older involved in:

- fatal and major injury crashes;
- fatal, major, and minor injury crashes (in such crashes there was at least one fatal, major or minor injury, all of which required transportation to and/or staying at the hospital);
- fatal, major, and minor injury crashes where the driver had engaged in improper driving behavior (driving too slow, making an improper turn, disobeying traffic controls, failing to yield, improper passing, losing control, driving the wrong way on a one way road, and making improper lane changes); and,
- fatal, major, and minor injury crashes with a left-turning maneuver. The latter is important because research has shown that older drivers are particularly at risk for crashing when they turn left across oncoming traffic (Mayhew, Simpson, & Ferguson, 2006; Smiley et al., 2012; Van Elslande & Fleury, 2000).

A quasi-experimental before/after design was used whereby for each of the four time series of counts of Ontario drivers aged 80 and older involved in crashes before and after the implementation of, and change to, the GES are compared to similar time series of two control groups, an 'internal' and an 'external' control group during the same time period. In this design, the counts of Ontario drivers aged 80 years and older served as the experimental time series of drivers who were subject to the GES, whereas drivers in both control groups were not subject to the GES. The internal control group consisted of Ontario drivers aged 75–79 years old involved in similar crashes. The external control group consisted of Canadian drivers aged 80 years and older, excluding Ontario drivers.

Interrupted S-ARIMA(X) time series analysis was used to evaluate the impact of the implementation of the GES and the change to this program (Linden & Adams, 2011). Using data only from the experimental group in the period preceding the implementation of the GES (i.e., January 1991 through to September 1996, inclusive), the structure of the experimental time series was investigated and used to build the final pre-intervention ARIMA time series model, as suggested by McCleary and Hay (McCleary & Hay, 1980). These pre-intervention series of counts have been investigated with special attention given to the overall pattern, outliers, variance, trends, and seasonality of the data. When necessary (presence of outliers or non-stationary variance) and possible (not too low counts) the pre-intervention time series were transformed using the natural log transformation. Selection of the final pre-intervention model was based on a comparison of information criteria (AIC and BIC) values of potential models, along with ARIMA terms that were significant as well as within the bounds of stationarity and invertibility (Yaffee, 2000). Tests of white noise were used to ensure that the final model's residuals were white noise and tests of normality were used to ensure the residuals were normally distributed.

Once the final ARIMA model was found based on the experimental pre-intervention time series using the approach described above, a set of dummy variables to model the intervention effect along with control group data and series of licensed drivers and population estimates for the entire study period were inserted in the final model simultaneously to test the hypotheses about possible intervention effects of the GES. Effects were considered significant if p-values were smaller than 0.05 (i.e., 5% level). Other variables that were simultaneously entered in the model included the number of licensed drivers of 80 years and older in Ontario (licdrON80: annual counts of licensed drivers in Ontario at least 80 years old), the number of licensed drivers aged 75–79 in Ontario (licdrON75: annual counts of licensed drivers in Ontario age 75–79)

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