Georgia Driver's Education Commission

Grant Scholarship Program & Joshua's Law Evaluation Report

Prepared for: Georgia Driver's Education Commission

By: Strategic Research Group

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Contents

Executive Summary

Background

In 1997, Georgia began implementing a graduated driver licensing (GDL) system for drivers ages 15-18 years with the Teenage and Adult Driver Responsibility Act (TADRA). The GDL process was later supplemented with Joshua's Law, which established requirements for how driver's education will be completed. In 2017, the Georgia Driver's Education Commission (GDEC) launched a scholarship program to assist students seeking to complete a driver's education program. This tiered scholarship program is designed to financially assist priority populations in being able to meet the requirements of Joshua's Law.

Purpose

The purpose of this research project was to examine the effectiveness of the GDEC scholarship program for young Georgia drivers, as well as to explore potential areas for program improvements. There were four primary research objectives focusing on 1) differences in driving incident outcomes among drivers who completed the GDEC scholarship program and other young drivers, 2) differences in driving incident outcomes by the type of driver's education provider, 3) differences in driving incident outcomes by the type of method used to complete driver's education requirements, and 4) differences of delayed licensure in driving incident outcomes.

Methodology

To answer the research objectives, three years of secondary data (2017-2019) was obtained from three sources: scholarship applicant data from GDEC, driving incident data from the Georgia Department of Transportation, and license history and driver record data from the Georgia Department of Driver Services (DDS). The Crash Outcome Data Evaluation System (CODES) program at the Georgia Department of Public Health Injury Prevention Program linked the data using personally identifiable information across the data sources and provided the redacted dataset used for the analysis.

The first two research objectives utilized data from the GDEC scholarship program and include data from drivers who completed the program and other applicants who were not awarded scholarships. The other two research objectives used a larger pool of Georgia drivers provided by DDS. When possible, comparison groups were created using one-to-one matches on demographics such as age, gender, race/ethnicity, and county (or county type).

The outcomes analyzed for each objective varied, depending on the availability of data elements within the various datasets and populations. Outcomes included whether the driver had received a conviction, number of convictions per year, whether the driver had ever experienced a crash, number of crashes per year, whether the driver had ever experienced a crash with serious injury or fatality (and the number per year), suspensions, and points received on their license. These outcomes are primarily incident rates (e.g., how often a crash or conviction occurred). The type of analysis used to determine if there are significant differences in the outcomes between groups are known as difference of means tests. Analyses primarily involved the use of independent sample t-test or ANOVA tests, as appropriate, to compare the differences of mean values on the outcomes. A standard approach for determining statistical significance was used, involving a 95 percent confidence level.

Overview of Findings

Overall, there were findings of statistical significance related to three of the four research objectives in this study. The study found that GDEC scholarship recipients experienced significantly fewer crashes per year and slightly higher Road Skills Test scores compared to their counterparts.

The type of provider delivering the driver's education instruction (technical colleges, high schools, or private/commercial providers) did not have any significant impact on driving outcomes among young drivers.

Comparisons of driving incident outcomes among the four different methods to complete Joshua's Law requirements found that Method 1 (which requires classroom education, as well as behind-the-wheel training with an approved instructor) drivers had significantly fewer convictions than drivers who used all other methods, fewer crashes than those in Method 2 and Method 4, and fewer serious injury and fatal crashes than Method 4. Method 2 drivers (who complete classroom education and the Parent/Teen Driving Guide) had fewer convictions than Method 4 drivers. Method 3 drivers (who complete online education and behind-the-wheel training with an approved instructor) were involved in fewer crashes and had fewer convictions than those in Methods 2 and 4. Method 4 drivers did not perform significantly better in any outcomes than any other method.

Finally, delayed drivers (those who received their license after turning age 18 years) tended to be involved in significantly fewer crashes, and serious injury crashes or fatal crashes. However, they experienced significantly more convictions compared to the young drivers who received their provisional license through the GDL process.

Conclusions

Based on these findings, conclusions can be drawn about how the factors studied relate to improved driving incident outcomes. Notably, drivers who completed the GDEC scholarship program tend to have improved outcomes relative to other drivers in terms of crash rates and Road Skills Test scores.

There were no notable differences when considering the type of driver's education provider that was used. Young driver crash and conviction outcomes did not significantly differ between driver's education provided from technical colleges, high schools, and private or commercial providers.

The method used to complete Joshua's Law requirements impacted incidents of crashes, convictions, and serious injury or fatal crashes. Drivers who had behind-the-wheel training with an approved instructor were involved in fewer crashes, serious injury or fatal crashes, and had fewer convictions than those who did not receive this training. Also, drivers who received classroom instruction had fewer convictions than those who received online instruction.

Finally, delayed licensure seems to have mixed results. Those who delayed in receiving their license tended to have fewer crashes, including serious injury or fatal crashes, but they were more likely to receive convictions.

Recommendations

Several recommendations result from these findings. First, the better outcomes among those who completed the GDEC scholarship program compared to the non-awarded applicants indicate that the program is worthy of funding and support, and expanded funding might be a route to further improved outcomes among a broader portion of Georgia's young drivers.

Second, young drivers using a method to meet Joshua's Law requirements that included six hours of behind-the-wheel training with an approved instructor had better driving outcomes than those utilizing the Parent/Teen Driving Guide. GDEC should consider making a recommendation to restructure Joshua's Law to require behind-the-wheel instruction with an approved instructor supplementing supervised driving with a parent or guardian for all methods.

The findings also indicate that classroom instruction is slightly more beneficial than online instruction. As such, it may be worthwhile to examine the extent to which the approaches used in the classroom and virtual settings differ, and to consider modifying online systems to better incorporate practices used in the classroom.

Due to the mixed results of the evaluation of delayed licensure, further exploration should be considered to understand this topic more fully. The current study was limited in its scope due to the availability of data. A study that collects information about individual driving behavior (to better control for different driving behaviors such as length of driving experience and amount of time spent driving under different conditions) may shed more light on the implications of delayed licensure.

Background: Georgia Young Driver Licensing, Citation, and Crash Trends

Licensing Trends

The Teenage and Adult Driver Responsibility Act (TADRA) of 1997 established the graduated driver licensing (GDL) system for young drivers ages 15-18 years in Georgia.[1] This law significantly changed how young drivers obtain and maintain their license by controlling how new drivers gain their experience behind the wheel, while reducing high-risk driving situations. As such, there are now three separate license classifications within the Georgia GDL system, described in the table below.

Table 1. Georgia Department of Driver Services License and Permit Descriptions

License Class	Description
Instructional Permit (Class CP)	Available to persons age 15 years and older after passing a knowledge examination.
Provisional License (Class D)	Issued to persons 16 and 17 years old who have held an Instructional Permit for 12 months and a day without committing any major traffic violations and have passed a comprehensive Road Skill Test. The provisional license gives driving privileges with restrictions.
Full License (Class C)	Available to persons 18 years old and older if there were no major traffic convictions for the previous 12 months.

Source: Department of Driver Services

Table 2 below compares the types of licensing obtained across various age groups from 2016 through 2019. The percentage of teens issued an instructional permit at age 15 increased during this period, with a net change of 3.5 percent more 15-year-olds obtaining permits in 2019 than in 2016. However, the percentage of teens issued a Class D license at ages 16 and 17 years has remained constant. The number of teens (16-17 years) waiting until age 18 to obtain a full license (Class C) increased by nearly three percent.

Table 2. Georgia Young Driver Age and License Type Issued (FY2016 - FY2019)

Young Driver Age and License Type Issued	2016		2017		2018		2019	
	Licenses	% of Pop	Licenses	% of Pop	Licenses	% of Pop	Licenses	% of Pop
Instructional Permit "CP" at Age 15	76,028	53.9	80,132	56.1	80,121	55.7	82,923	57.4
Class D at Age 16	53,566	37.6	52,519	36.4	54,418	37.5	54,924	37.7
Class D at Age 17	30,716	21.3	30,224	20.8	31,853	21.7	31,308	21.3
Class C as first license at Age 18	44,334	30.6	46,019	31.4	47,310	32.0	49,647	33.5

Source: Department of Driver Services; OASIS

Joshua's Law Requirements and Methods

In 2005, Georgia adopted Senate Bill 226, also known as "Joshua's Law," to change teen driver's licensing requirements with the goal of improving teen driver safety.[2] While a graduated driver licensing system had been in place in Georgia since the Teenage and Adult Driver Responsibility Act (TADRA) of

[1] http://www.gohs.state.ga.us/fullpanel/uploads/files/tadra-002.pdf

[2] Senate Bill 226 (Article 10 of Chapter 21 of Title 15 of the Official Code of Georgia Annotated)

1997, Joshua's Law included a requirement for driver's education to supplement existing licensure requirements. It required completion of an approved driver's education course and the completion of 40 hours of supervised driving, including six hours of night driving.[3]

There are four approved methods for meeting the Joshua's Law driver's education requirements. Each method consists of some combination of *instruction* (either classroom or online) at a Department of Driver Services (DDS) approved school and *supervised driving* (either six hours of behind-the-wheel training with an approved DDS school instructor along with 40 hours of supervised driving with a parent/guardian, or completion of the Parent/Teen Driving Guide). The details of each method are summarized in Figure 1 below.

Figure 1. Methods to Meet the Joshua's Law Driver's Education Requirements

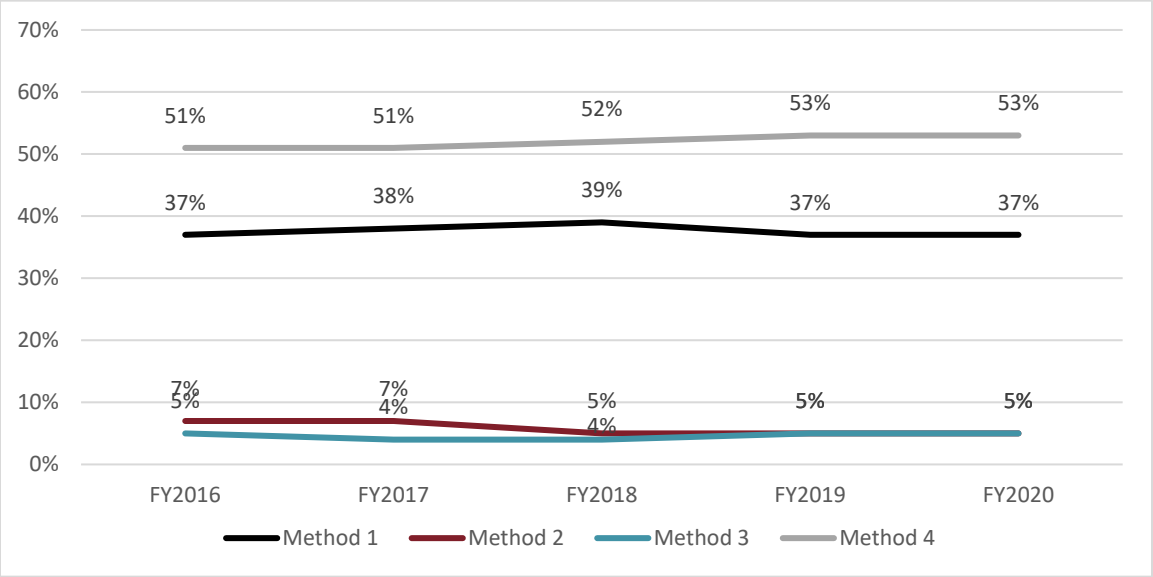
Method **1**	30 hours of classroom instruction at a DDS approved school	+	Six hours of behind-the-wheel training at a DDS approved school	+	40 hours of supervised driving with parent or guardian
Method **2**	30 hours of classroom instruction at a DDS approved school	+	Completion of the Parent/Teen Driving Guide at a DDS approved school *(includes 40 hours of supervised driving with parent or guardian)*		
Method **3**	DDS approved school online (virtual) course	+	Six hours of behind-the-wheel training at a DDS approved school	+	40 hours of supervised driving with parent or guardian
Method **4**	DDS approved school online (virtual) course	+	Completion of the Parent/Teen Driving Guide *(includes 40 hours of supervised driving with parent or guardian)*		

All methods described above requires a total of 40 hours of supervised driving, six hours of which must be at night.

Method 4 is the most commonly used method for young drivers to obtain a Provisional License (Class D). Since FY2016, more than half of all young drivers who had their method recorded obtained their Class D license using Method 4. Method 1 was the second most common method used to obtain a Class D license, with an average of 37 percent of young drivers using this method each year since FY2016. The least commonly used methods were Method 2 and Method 3. Figure 2 shows how young drivers obtained their Class D license using the various methods between FY2016 and FY2020.

[3] For more information, see https://dds.georgia.gov/joshuas-law-explained-faqs

Figure 2. Percent of Class D Licenses Issued by GDL Method (FY2020)



Source: Department of Driver Services

Population-based Licensure Among Young Georgians

According to the DDS annual reports, there were 7.8 million licensed drivers in Georgia in 2019. Young drivers (those ages 15-20 years) accounted for 7.9 percent of all licensed drivers in 2019. Across the state, 71.1 percent of all Georgia youth held either an instructional permit or driver's license.

The tables below present the licensing status of young Georgians as of December 2020 by rural and urban county residence and by gender.[4] The percentage of young adults who held a license in 2020 was nearly the same across all rural counties (75.2%) and urban counties (73.1%). However, rural 15- and 16-year-olds were more likely to be licensed than their urban counterparts. Conversely, by 19 and 20 years of age, urban youth were more likely to be licensed.

Table 3. Urban vs. Rural Licensed Young Drivers (Ages 15-20) by License Type

Age (years)	Urban: OMB Metro Counties				Rural: Nonmetro Counties			
	Instructional Permit		License (Class C or D)		Instructional Permit		License (Class C or D)	
	N	Pct	N	Pct	N	Pct	N	Pct
15 years	49,400	42.3	-	0.0	12,361	55.1	-	0.0
16 years	43,760	36.2	31,118	25.7	8,420	35.7	8,508	36.1
17 years	28,096	23.1	59,284	48.6	4,745	19.9	13,722	57.7
18 years	17,855	14.6	79,376	64.8	2,910	11.8	17,108	69.2
19 years	12,087	9.9	94,185	77.5	2,002	7.5	19,747	73.7
20 years	9,654	8.1	102,630	86.6	1,592	5.7	21,165	75.6

Source: Licensing data provided by DDS (see data source description below; population data retrieved from OASIS)

[4] DDS license data was pulled on December 16, 2020.

Differences in licensure by gender were more modest, with the largest difference being that five percent more 15-year-old female drivers held an instructional permit than male drivers. Overall, three percent more young females were licensed drivers than males.

Table 4. Female vs. Male Licensed Young Drivers (Ages 15-20) by License Type

Age (years)	Female				Male			
	Instructional Permit		License (Class C or D)		Instructional Permit		License (Class C or D)	
	N	Pct	N	Pct	N	Pct	N	Pct
15 years	31,954	46.8	-	0.0	29,807	42.1	-	0.0
16 years	26,101	36.7	20,640	29.0	26,081	35.6	18,986	25.9
17 years	16,013	22.3	37,190	51.8	16,829	22.8	35,816	48.5
18 years	10,264	14.3	48,263	67.0	10,502	14.0	48,221	64.2
19 years	7,146	9.8	56,669	77.5	6,944	9.2	57,265	76.1
20 years	5,843	8.1	61,937	85.8	5,407	7.3	61,860	83.3

Source: Licensing data provided by DDS (see data source description below; population data retrieved from OASIS)

Driving Behavior

Convictions result when a court finds a driver guilty of violating a traffic law. The information provided below describes the conviction rates for young drivers ages 15 to 20 years during the study period (2017-2019). Most Georgia youth (77.9%) never had a conviction during the study period. Urban drivers had slightly fewer convictions than rural drivers and female drivers were less likely to have at least one conviction than male drivers (18.6% vs. 25.7%).

Table 5. Number of convictions by County Type and by Gender

Number of Convictions	County Type				Gender			
	Urban: OMB Metro Counties		Rural: Nonmetro Counties		Female		Male	
	N	Pct	N	Pct	N	Pct	N	Pct
None	709,651	78.0	144,235	76.9	445,944	81.4	407,964	74.3
1	108,941	12.0	22,491	12.0	60,232	11.0	71,211	13.0
2	41,960	4.6	9,226	4.9	20,920	3.8	30,271	5.5
3	20,324	2.2	4,564	2.4	9,260	1.7	15,630	2.8
4	10,824	1.2	2,521	1.3	4,625	0.8	8,722	1.6
5 or more	17,543	1.9	4,420	2.4	6,790	1.2	15,176	2.8

Source: Licensing data provided by DDS (see data source description below; population data retrieved from OASIS)

Crash Trends

In 2018, there were 74,735 crashes that involved young drivers in Georgia.[5] Young drivers represented 8.9 percent of all drivers involved in fatal crashes in 2018. Since 2014 there has been a gradual increase in the number of young drivers ages 15-20 years involved in fatal crashes (Figure 3). The number of

[5] This does not imply that young drivers caused the crash either by their actions or failure to act, simply that they were involved in the crash.

young drivers involved in fatal crashes has increased by 32.4 percent, from 145 drivers in 2014 to 192 drivers in 2018.

Figure 3. Young Drivers Involved in Fatal Crashes (2010-2019)

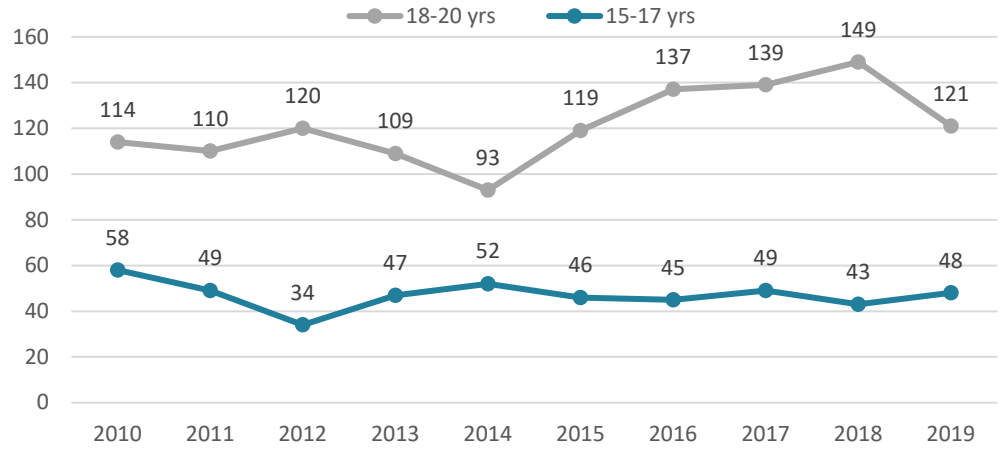


Figure 4 shows these fatal crashes by the rural or urban classification of the segment of the trafficway on which the crash occurred.[6,7] Generally, more fatal crashes involving young drivers occurred on roads classified as urban, with the largest difference in age groups seen among drivers ages 18-20 years.

Figure 4. Young Drivers Involved in Fatal Crashes by Rural or Urban Road Type (2010-2019)

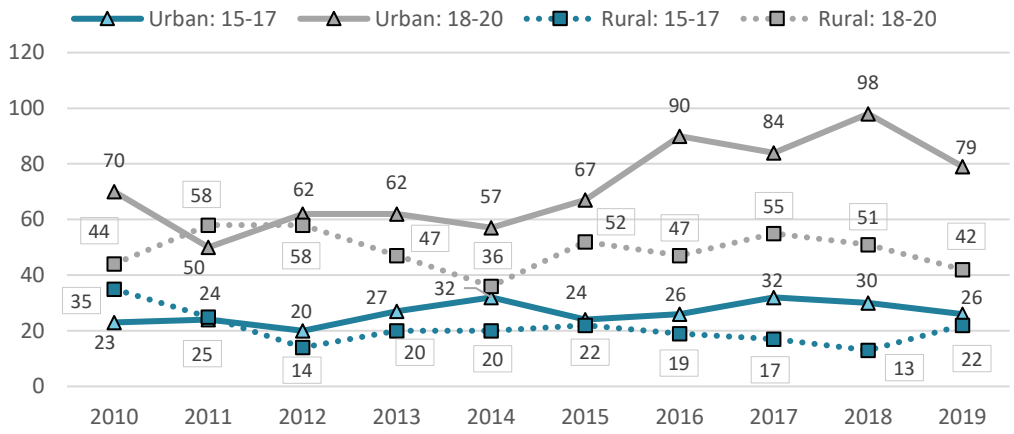


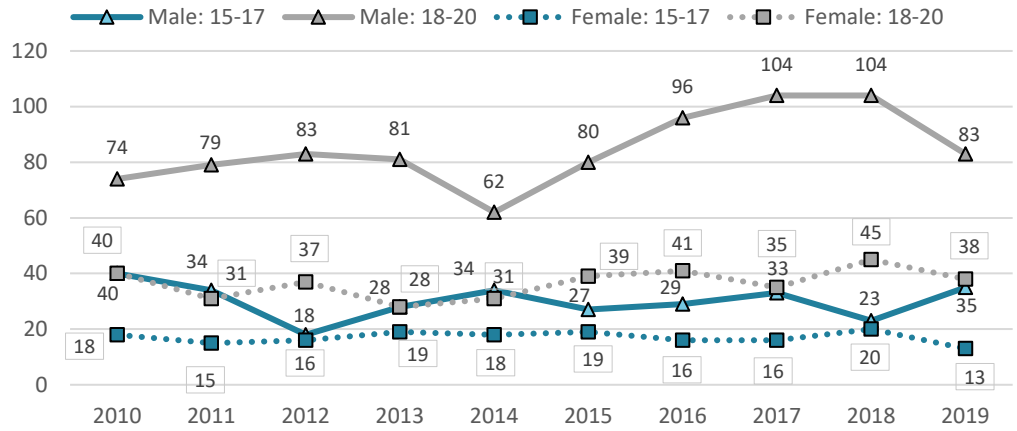
Figure 5 shows these fatal crashes by the gender of the driver.[8] A consistent trend in these data show that male drivers ages 18-20 years have the highest percentages of fatal crashes, averaging about 50 percent across all years, compared to younger drivers and female drivers.

[6] Classification based on FHWA-approved adjusted Census boundaries of small urban and urbanized areas

[7] Fatal crashes by rural or urban county classification are provided in Appendix A (TableA1)

[8] Fatal crashes by urban/rural road type (Table A2) by gender and urban/rural county (Table A3) by gender are provided in Appendix A.

Figure 5. Young Drivers Involved in Fatal Crashes by Gender (2010-2019)



About the GDEC Program

Program Purpose

Senate Bill 226 (2005), known as Joshua's Law, outlined the guidelines for Georgia's Graduated License (GDL) Program and included a surcharge on all Georgia traffic citations to establish funding to support driver's education programs throughout the state. This Bill also led to the establishment of the Georgia Driver's Education Commission (GDEC) to recommend changes in state programs, statutes, policies, budgets, and standards relating to the provision of driver's education and training to the Governor and General Assembly.

GDEC's mission is to maximize participation in driver's education and training to reduce motor vehicle crashes by making driver's training accessible and affordable to all Georgians. As such, GDEC developed a grant scholarship program open to Georgia residents ages 15-17 years who want to satisfy the Joshua's Law driver's education requirement by completing thirty hours of classroom instruction and six hours of behind-the-wheel driving instruction with an approved instructor (Method 1 of satisfying Joshua's Law).

GDEC Scholarship Program Selection Process

Scholarships are awarded on a tiered priority system and grant scholarship allocations are evenly distributed among Georgia's United States congressional districts. First priority (Tier 1) is given to grant scholarship applicants who are a child or dependent of a public safety professional killed in the line of duty or member of the United States military killed in action. Second priority (Tier 2) is given to scholarship applicants who can demonstrate a need based on family income (financial need eligibility is based on 125 percent of the free and reduced price school meal eligibility for Georgia). If funding cannot support all applicants in Tier 2, one scholarship applicant is randomly selected per congressional district of residence until all scholarships are awarded. Third priority (Tier 3) is given to all applicants who do not meet the criteria set forth in Tier 1 or Tier 2 outlined above. Similarly, if funding cannot support all applicants in Tier 3, one scholarship applicant is randomly selected per congressional district of residence until all scholarships are awarded.

GDEC Applicants

Between 2017 and 2019, 26,810 individuals applied for the Georgia Driver's Education Grant Scholarship program, and the Commission awarded 16,703 driver's education scholarships. Of the scholarships awarded, 1,855 students forfeited scholarships or chose not to complete driver's education through an authorized provider in the program. The remaining 14,848 students (88.9%) who completed driver's education through the program represent a value of $5,867,478 paid in driver's education grant scholarships.

A detailed description of the number of applications, awards, graduates, and scholarships redeemed is provided in Appendix A (Table A4).

Research Purpose and Scope

Research Objectives

The main goal of this analysis was to conduct a series of quantitative analyses and investigations aimed at determining the effectiveness of the GDEC grant scholarship program for young drivers in Georgia and to explore program improvements. The research objectives for this analysis included:

- **Objective 1:** Examining the differences in driving incident outcomes among GDEC scholarship recipients who completed the program and other young drivers
- **Objective 2:** Examining the differences in driving incident outcomes by GDEC provider type
- **Objective 3:** Examining the differences in driving incident outcomes by method used to complete the Graduated Driver License (GDL) requirements
- **Objective 4:** Examining the differences of delayed licensure in driving incident outcomes[9]

Many potential driving outcomes were examined to determine which outcome variables could be used for analysis. Data for these outcomes were reviewed for completeness and structure to determine if they were appropriate for outcome analysis. Some outcome variables were not selected for analysis because the data fields were very complex and standardizing them for analysis was problematic and subjective. Other outcomes were not available for all drivers in our analyses. Outcome variables used in the analyses included Road Skills Tests, points on driving record, convictions, suspensions, crashes, and crashes with serious injuries or fatalities. Detailed descriptions of these outcome variables are provided in Appendix B (Table B1).

Use of the research findings

Evaluation findings will be used to improve the GDEC grant scholarship program and to determine the extent to which the program influences student outcomes associated with safety, such as safe driving practices and driving skills. Findings will also be used to make recommendations for statewide driver's education improvements in Georgia.

[9] "Delayed" refers to novice drivers 18+ years who do not have to complete Graduated Driver License (GDL) requirements.

Methodology

A summary of the data sources used in the analysis, the driver groups created for the comparisons needed to answer the research objectives, and the types of analyses undertaken are provided in this section.

Data Sources

Data for these analyses are from three sources, listed below:

- **Georgia Driver's Education Commission (GDEC) Applicant Data:** Data from the GDEC application database on all student applicants applying for the GDEC scholarship between 2017 and 2019.[10]
- **Crash Data:** Data from the Georgia Department of Transportation (GDOT) on all motor vehicle crashes involving young drivers ages 15-23 years between 2017 and 2019.
- **License History and Driving Record Data** (obtained from the Georgia Department of Driver Services (DDS)**:**
    - Licensing history and driving record for young drivers ages 15-23 years involved in motor vehicle crashes between 2017 and 2019.
    - Licensing history and driving record for all GDEC scholarship applicants.
    - Redacted record summaries for approximately 890,000 other young drivers ages 15-23 years who obtained a license between 2017 and 2019 in Georgia.

To perform the required analyses, data from the GDOT crash database, the DDS driver's licensing and history data, and the GDEC applicant data needed to be linked. This linkage process was conducted in a secure environment within the Crash Outcome Data Evaluation System (CODES) program at the Georgia Department of Public Health Injury Prevention Program. Data were linked using driver's license (or learner's permit) number as well as other Personally Identifiable Information (PII) to create complete data records containing driving history information and crash data for each individual in the study. Redacted datasets were then provided to Strategic Research Group for analysis.

A detailed description of each of these datasets and the data linkage process is provided in Appendix B.

Comparison Groups

GDEC scholarship applicant (awardee and non-awardees) data were used in the analysis comparing driving outcomes of GDEC drivers (scholarship recipients who completed the GDEC program) and other young drivers and in the analysis comparing outcomes by GDEC provider type. The research objectives examining driving outcomes by method used to complete the GDL requirements and the impact of delayed licensure utilized a larger pool of Georgia drivers provided by DDS.

To answer the research objectives posed above, a series of comparison groups were created. These comparison groups were:

- The comparison of GDEC scholarship recipients who completed the program vs. non-awarded applicants were limited to Tier 2 applicants to control for differences in applicant economic status. Among Tier 2 applicants, awardees are randomly selected so the award selection process

[10] The GDEC scholarship program began February 1, 2017.

will not introduce differences between the groups. All individuals from Tier 2 in either group were included in the analysis. (Cases in these groups were not individually matched.)

- Groups were created for each set of GDL requirement method comparison, which was 12 groups total. As a note and consideration, drivers self-selected which method they used to complete the GDL requirements, so it is possible groups differ on factors beyond demographics. In each case, individuals from the method with the smallest number of cases were matched to individuals from the larger group on age, gender, race (when known), and either exact county or urban/rural region. (Cases in these groups were a 1-to-1 match.)
- For the comparison of delayed drivers vs. drivers who did not delay licensure until age 18, the delay group consisted of drivers ages 18-23 years who had a Road Skills Test and no record with DDS before turning 18. The non-delayed drivers were demographically similar by gender, race (when known), county, and age minus two years (to approximate matching driving experience) who had a Class D license for at least 6 months. (Cases in these groups were a 1-to-1 match.)

Table 6 provides the number of drivers in each of the comparison groups. A full description of these groups, their composition, and the matching criteria is provided in Appendix B.

Table 6. Number of Cases in Comparison Groups

Comparison Groups†		**Number of cases in Sample**
Research Objective 1	TIER 2 GDEC Scholarship	10,299
	TIER 2 Non-GDEC	2,312
Research Objective 3	Method 1v2	23,515
	Method 3v4	17,831
	Method 1v3	17,828
	Method 2v4	23,518
	Method 1v4	155,499
	Method 2v3	16,784
Research Objective 4	Delayed vs Non- delayed	72,357

† For research objectives 3 and 4, the number of cases reported is per group, so the total number of cases in the comparison dataset is twice this number due to the 1-to-1 matching.

Analysis

For most analyses, independent sample t-tests or Analysis of Variance (ANOVA) tests were used to compare the difference of means on each outcome variable between two or more study cohorts. Differences were considered statistically significant at a 95 percent confidence level, $p \leq 0.05$. This means that there is a 95 percent probability that these differences are real and not due to chance. A full description of the analytical approach can be found in Appendix C.

Results

This section provides the findings from the analyses presented by each research objective. Each set of findings will begin by stating the research objective, the outcomes examined, and the type of analysis conducted, followed by the significant findings from the analysis and the key take-aways. The results of all analyses, including the results of the tests for significance and, when statistically significant, the percentage differences, can be found in Appendix C.

Objective #1: GDEC Drivers Compared to Other Young Drivers

Objective #1: Examine the differences in driving incident outcomes among GDEC drivers and other young drivers.

The following outcomes were analyzed to compare GDEC drivers and other young drivers:

- Crashes (whether driver was involved in any crash)
- Crashes (per year)
- Convictions (whether driver received any conviction)
- Convictions (per year)
- Points accumulated per year
- Road Skills Test scores
- Serious injury crashes
- Suspensions

For this analysis, driving outcomes for Tier 2 GDEC drivers (scholarship recipients who completed the program) were compared to all Tier 2 applicants who were not awarded.[11] Comparison of means t-tests were used to identify statistically significant differences. For the full table of results, see Table C1 in Appendix C.

Significant findings: Results indicated that the GDEC drivers had fewer crashes per year and slightly higher average Road Skills Test scores. The rate of crashes per year among Tier 2 GDEC students is 14.0 percent lower compared to Tier 2 eligible, non-GDEC students. On average, Tier 2 GDEC students score a half point better on their Road Skills Test compared to Tier 2 non-GDEC students.[12]

Table 7. Outcome Analysis for Research Objective #1

Groups Compared: GDEC Drivers vs. Non-awarded; Analysis: independent t-test				
Driving Outcomes	**GDEC Average**	**Non-GDEC Average**	**P-Value**	**Percentage Difference**
Crashes per Year	0.0937	0.108	0.021	14.0%
Road Skills Test Scores	86.1	85.5	0.015	0.7%

Table 8. Method used by non-GDEC Tier 2 Applicants

Method	N	%	Known %
Method 1	429	18.6%	39.0%
Method 2	33	1.4%	3.0%
Method 3	36	1.6%	3.3%
Method 4	602	26.0%	54.7%
Method Unknown	1,212	52.4%	-
Total	2,312	100.0%	100.0%

While all students completing the GDEC scholarship program use Method 1 to meet the Joshua's Law requirement, the Tier 2 applicants not selected could choose any of the methods. The methods of completion for the non-GDEC students are shown in Table 8. Note that over half of the records provided had missing or unknown method. At least a quarter of non-awarded applicants used Method 4 to complete the Joshua's Law requirement and the

[11] It should be noted that awardees in Tier 2 are randomly selected.

[12] This finding is *statistically significant* but not *substantially significant*. The analysis shows that this difference is likely real, hence a statistically significant difference, however the score difference itself is slight, not substantial.

distribution of known methods indicates that it is possible over half of non-awarded applicants may have used Method 4.

Objective #2: Examine the differences in driving incident outcomes by GDEC provider type.

The following outcomes were analyzed to compare GDEC provider types:

- Crashes (whether driver was involved in any crash)
- Crashes (per year)
- Convictions (per year)
- Fatalities and serious injuries (total)
- Points accumulated per year
- Suspensions

Objective #2: GDEC Provider Type Comparison

To determine if there were any differences in driving outcomes between types of GDEC providers, the driving outcomes of three types of providers were compared. The provider types compared in the analysis were:

- Technical Colleges
- High Schools
- Private/Commercial Schools

Analysis of Variance (ANOVA) tests were used to identify statistically significant differences. For the full table of results, see Table C2 in Appendix C.

Significant findings: There were no statistically significant differences in outcomes among the GDEC provider types. This indicates that there is no evidence that the type of GDEC provider used to complete the GDL requirement impacted driver outcomes. Driver outcomes do not differ by GDEC provider type.

Objective #3: Joshua's Law Method Comparisons

Objective #3: Examine the differences in driving incident outcomes by Joshua's Law Method used to complete the GDL requirements.

The following outcomes were analyzed to compare the methods by which drivers completed the Graduated Driver License requirements:

- Crashes (whether driver was involved in any crash)
- Crashes (per year)
- Convictions (per year)
- Fatalities and serious injuries (total)
- Fatalities (per 1,000 individuals)

To compare each of the different Joshua's Law methods of completing the GDL requirements to each other, matched groups with 1-to-1 matches based on drivers' age, gender, race (when known), and county type were created for each comparison (see Appendix B for details). Table 9 indicates which components of the methods (instruction type or driver training) are constant in a comparison and which are different. Focusing on what components differ in a comparison will highlight if those components led to better or worse driving outcomes for young drivers.

Table 9. GDL Requirement Method Comparison Groups

Cohort 1	Cohort 2	Constant	Difference
Method 4	Method 1		Online course and Parent/ Teen /Driving Guide **vs.** 30 hours of classroom instruction and six hours of behind- the-wheel training
	Method 2	Parent/Teen Driving Guide	Online **vs.** Classroom
	Method 3	Online Course	Parent/Teen Driving Guide **vs.** six hours of behind-the-wheel training
Method 1	Method 2	30 hours of classroom instruction	Six hours of behind-the-wheel training **vs.** Parent/Teen Driving Guide
	Method 3	Six hours of behind- the-wheel training	Classroom **vs.** Online
Method 2	Method 3		30 hours of classroom instruction and Parent/ Teen Guide **vs.** online course and six hours of behind-the-wheel training

Cohorts 1 and 2 were matched (one-to-one) based on age, gender, race/ethnicity (when known), and urban/rural region

The results of the Joshua's Law methods of completing the GDL requirements comparisons are presented by which aspect of the methods differ between the groups being compared. The first set of comparisons (Method 1 vs. Method 2 and Method 3 vs. Method 4) compare the use of the Parent/Teen

Driving Guide to six hours of behind-the-wheel training with an approved instructor. The next set of comparisons (Method 1 vs. Method 3 and Method 2 vs. Method 4) compare classroom instruction to online instruction. The final set of comparisons (Method 1 vs. Method 4 and Method 2 vs. Method 3) have completely different combinations of instruction mode and supervised driving training, thus providing a general comparison of one combination to another.

Findings Comparing Driver Training Approach

	Constant	Difference
Method 1 vs 2:	30 hours of classroom instruction	Six hours of behind-the-wheel training (M1) vs. Parent/Teen Driving Guide (M2)

The following summarizes the results of the comparison between Methods 1 and 2. This approach highlights any differences between a method that uses behind-the-wheel time with an approved instructor versus the use of the Parent/Teen Driving Guide, with both groups receiving classroom instruction. For the full table of results, see Table C3 in Appendix C.

Significant findings: Results indicated that young drivers who use Method 1 experience significantly fewer crashes and convictions compared to those who use Method 2. The proportion of drivers having a crash among Method 1 drivers is 3.6 percent lower compared to Method 2 drivers. The number of convictions among Method 1 drivers is 17.3 percent lower compared to Method 2 drivers.

Table 10. Outcome Analysis for Research Objective #3 (M1 vs M2)

Groups Compared: Method 1 vs. Method 2 Analysis: independent t-test				
Driving Outcomes	**Method 1 Average**	**Method 2 Average**	**P-Value**	**Percentage Difference**
Crash (Y/N)	0.262	0.271	0.017	3.6%
Number of Convictions	0.467	0.556	0.000	17.3%

	Constant	Difference
Method 3 vs 4:	Online Course	Six hours of behind-the-wheel training (M3) vs. Parent/Teen Driving Guide (M4)

The following summarizes the results of the comparison between Methods 3 and 4. This approach highlights any differences between a method that uses behind-the-wheel time with an approved instructor versus the use of the Parent/Teen Driving Guide, with both groups receiving online instruction. For the full table of results, see Table C4 in Appendix C.

Table 11. Outcome Analysis for Research Objective #3 (M3 vs M4)

Groups Compared: Method 3 vs. Method 4 Analysis: independent t-test				
Driving Outcomes	**Method 3 Average**	**Method 4 Average**	**P-Value**	**Percentage Difference**
Crash (Y/N)	0.255	0.274	0.000	7.1%
Number of Crashes	0.319	0.352	0.000	9.8%
Number of Convictions	0.463	0.553	0.000	17.7%

Significant findings: Results indicated that young drivers who use Method 3 experience significantly fewer crashes and convictions compared to those who use Method 4. The proportion of Method 3 drivers experiencing a crash is 7.1 percent lower compared to Method 4 drivers. The number of crashes among Method 3 drivers is 9.8 percent lower compared to Method 4 drivers. The number of convictions among Method 3 drivers is 17.7 percent lower compared to Method 4 drivers.

Findings Comparing Type of Instruction

Method 1 vs 3:	**Constant**	**Difference**
	Six hours of behind-the-wheel training	Classroom (M1) vs. Online (M3)

The following summarizes the results of the comparison between Methods 1 and 3. This approach highlights any differences between a method that uses classroom versus online instruction, with both groups receiving behind-the-wheel time with an approved instructor. For the full table of results, see Table C5 in Appendix C.

Significant findings: Results indicated that young drivers who use Method 1 experience significantly fewer convictions compared to those who use Method 3. The number of convictions among Method 1 drivers is 8.5 percent lower compared to Method 3 drivers.

Table 12. Outcome Analysis for Research Objective #3 (M1 vs M3)

Groups Compared: Method 1 vs. Method 3 Analysis: independent t-test				
Driving Outcomes	**Method 1 Average**	**Method 3 Average**	**P-Value**	**Percentage Difference**
Number of Convictions	0.425	0.463	0.003	8.5%

Method 2 vs 4:	**Constant**	**Difference**
	Parent/Teen Driving Guide	Classroom (M2) vs. Online (M4)

The following summarizes the results of the comparison between Methods 2 and 4. This approach highlights any differences between a method that uses classroom versus online instruction, with both groups using the Parent/Teen Driving Guide. For the full table of results, see Table C6 in Appendix C.

Significant findings: Results indicated that young drivers who use Method 2 experience significantly fewer convictions compared to those who use Method 4. The number of convictions among Method 2 drivers is 9.1 percent lower compared to Method 4 drivers.

Table 13. Outcome Analysis for Research Objective #3 (M2 vs M4)

Groups Compared: Method 2 vs. Method 4 Analysis: independent t-test				
Driving Outcomes	**Method 2 Average**	**Method 4 Average**	**P-Value**	**Percentage Difference**
Number of Convictions	0.556	0.608	0.000	9.1%

Findings Comparing Different Mixes of Instruction and Driver Training Approach

	Constant	**Difference**
Method 1 vs 4:	None	30 hours of classroom instruction and six hours of behind-the-wheel training (M1) vs. Online Course & Parent/Teen Driving Guide (M4)

The following summarizes the results of the comparison between Methods 1 and 4. This approach highlights any differences between approaches that are completely opposite (in terms of classroom versus online and Parent/Teen Driving Guide use versus six hours of behind-the-wheel time). For the full table of results, see Table C7 in Appendix C.

Table 14. Outcome Analysis for Research Objective #3 (M1 vs M4)

Groups Compared: Method 1 vs. Method 4 Analysis: independent t-test				
Driving Outcomes	**Method 1 Average**	**Method 4 Average**	**P-Value**	**Percentage Difference**
Number of Crashes	0.313	0.348	0.000	10.5%
Crash (Y/N)	0.250	0.272	0.000	8.3%
Total Fatalities & Serious Injuries	0.00179	0.00255	0.000	35.0%
Number of Convictions	0.405	0.560	0.000	32.0%

Significant findings: Results indicated that young drivers who use Method 1 experience significantly fewer crashes, serious injuries and fatalities, and convictions compared to those who use Method 4. The number of crashes among Method 1 drivers is 10.5 percent lower compared to Method 4 drivers. The proportion of drivers having a crash among Method 1 drivers is 8.3 percent lower compared to Method 4 drivers. The number of serious injuries and fatalities among Method 1 drivers is 35.0 percent lower compared to Method 4 drivers. The number of convictions among Method 1 drivers is 32.0 percent lower compared to Method 4 drivers.

	Constant	**Difference**
Method 2 vs 3:	None	30 hours of classroom instruction & Parent/Teen Driving Guide (M2) vs. online instruction & six hours of behind-the-wheel training (M3)

The following summarizes the results of the comparison between Methods 2 and 3. This approach highlights any differences between approaches that are completely opposite (in terms of classroom versus online and Parent/Teen Driving Guide use versus behind-the-wheel time with an approved instructor). For the full table of results, see Table C8 in Appendix C.

Table 15. Outcome Analysis for Research Objective #3 (M2 vs M3)

Groups Compared: Method 2 vs. Method 3 Analysis: independent t-test				
Driving Outcomes	**Method 2 Average**	**Method 3 Average**	**P-Value**	**Percentage Difference**
Number of Crashes	0.332	0.313	0.005	5.8%
Crash (Y/N)	0.267	0.251	0.001	6.3%
Total Fatalities & Serious Injuries	0.00238	0.00137	0.046	54.0%
Number of Convictions	0.509	0.456	0.000	11.0%

Significant findings: Results indicated that young drivers who use Method 3 experience significantly fewer crashes, serious injuries and fatalities, and convictions compared to those who use Method 2. The number of crashes among Method 3 drivers is 5.8 percent lower compared to Method 2 drivers. The proportion of drivers having a crash among Method 3 drivers is 6.3 percent lower compared to Method 2 drivers. The number of serious injuries and fatalities among Method 3 drivers is 54.0 percent lower compared to Method 2 drivers. The number of convictions among Method 3 drivers is 11.0 percent lower compared to Method 2 drivers.

Summary of Joshua's Law Method Comparisons

Considering these findings all together, each method can be ranked based on how their driving outcomes compared to each other method. Findings from the analyses suggest that Method 1 performed the best, followed by Method 3, then Method 2, and finally Method 4 (which had no comparison of driving outcomes in its favor). Specifically, in every scenario where Method 1 was compared to any other method, any statistically significant differences favored Method 1. In every scenario where Method 3 was compared to any other method (except Method 1), any statistically significant differences favored Method 3. In no cases did Method 4 have any statistically significant results that were better than any other method.

Taken together, these findings indicate the below ranking of each method:

1. **Method 1:** Classroom instruction with behind-the-wheel instructor hours
2. **Method 3**: Online instruction with behind-the-wheel instructor hours
3. **Method 2:** Classroom instruction with Parent/Teen Driving Guide
4. **Method 4:** Online instruction with Parent/Teen Driving Guide

These findings are notably important given that the two most common methods for completing the GDL requirements rank first and last among these driver outcome comparisons.

Objective #4: Findings Comparing Delayed Licensure vs. Non-Delayed Licensure

Objective #4: Examine the differences of delayed licensure in driving incident outcomes.

The following outcomes were analyzed to compare drivers who delayed getting their license until age 18 and those who went through the GDL requirements:

- Crashes (whether driver was involved in any crash)
- Crashes (per year)
- Convictions (per year)
- Fatalities and serious injuries (total)
- Fatalities (per 1,000 individuals)

The impact of delaying licensure was also evaluated.[13] Delaying licensure until age 18 was examined by comparing a group of young drivers with no record of licensure and no record with DDS before turning 18 (the delayed group) with demographically similar individuals based on gender, race (when known), county, and age minus two years who had a Class D license for at least six months. Comparison of means t-tests were used to identify statistically significant differences. For the full table of results, see Table C9 in Appendix C.

Significant Findings: Results of the impact of delaying licensure were mixed, with the delayed group experiencing fewer crashes and fewer serious injury or fatal crashes, but more convictions. The number of crashes among delayed licensure drivers is 77.7 percent lower compared to non-delayed drivers. The proportion of crashes among delayed licensure drivers is 77.3 percent lower compared to non-delayed drivers. The number of serious injuries and fatalities among delayed licensure drivers is 82.0 percent lower compared to non-delayed drivers. The number of convictions among delayed drivers is 57.1 percent higher compared to non-delayed drivers.

Table 16. Outcome Analysis for Research Objective #4

Groups Compared: delayed vs. Non-delayed; Analysis: independent t-test				
Driving Outcomes	**Non-Delayed Average**	**Delayed Average**	**P-Value**	**Percentage Difference**
Number of Crashes	0.347	0.153	0.000	77.7%
Crash (Y/N)	0.270	0.120	0.000	77.3%
Total Fatalities & Serious Injuries per 1000	0.184	0.0774	0.000	82.0%
Number of Convictions	0.438	0.788	0.000	57.1%

[13] Delayed licensure is considered to be novice drivers 18 years or older, who do not have to complete Graduated Driver License requirements.

Implications / Conclusions

As set forth in Joshua's Law (SB 226), GDEC assists with guiding changes to state programs, statutes, policies, budgets, and standards in regard to the provision of driver's education. The objective of this guidance is to maximize participation in driver's education and training to reduce inexperienced driver crashes. The research objectives posed by this study, the various data obtained and analyzed, and the resulting findings provide a range of insights into how best to address this objective.

A number of implications result from analyses that examined differences in driving incident outcomes among different driver groups (GDEC drivers and other young drivers, drivers using different methods to complete the GDL requirements, and delayed licensure drivers compared to non-delayed drivers). When comparing the four methods of meeting the Joshua's Law driver's education requirements, there are implications regarding the role of different course options (either classroom instruction at a DDS approved school or completion of a DDS approved online course), and different supervised driving options (either completion of six hours of behind-the-wheel training with an instructor at a DDS approved school plus 40 hours of supervised driving with a parent or guardian, or completion of the Parent/Teen Driving Guide).

Regarding supervised driving options, drivers who had behind-the-wheel training with an approved instructor were involved in fewer crashes, serious injuries or fatal crashes, and convictions during this same period than those who did not receive this training. Regarding course options, drivers who received classroom instruction received fewer convictions than those who received online instruction.

In looking at differences in driving incident outcomes among drivers who completed the GDEC scholarship program and other young drivers, it was found that the rate of crashes per year among GDEC drivers is lower than that of non-scholarship applicants, and also that GDEC drivers, on average, scored slightly higher on their Road Skills Tests than their non-scholarship counterparts. The GDEC program utilizes the Method 1 approach to completing Joshua's Law driver's education requirements, including thirty hours of classroom instruction and six hours of behind-the-wheel driving instruction with an approved instructor, both of which were associated with involvement in fewer crashes and crashes with serious injuries or fatalities.

Method 1 was the GDL requirement method found to have the best driver outcomes in comparison with the other methods. The comparisons of the driving method indicated that students who complete 6 hours of behind-the-wheel training with an instructor had better outcomes compared to students that do not have this type of instruction. This was a finding supported in each comparison for both crash and conviction outcomes. These comparisons also indicated that classroom instruction was associated with fewer convictions than online instruction.

Regarding the role of delayed licensure as it relates to driving incident outcomes, these analyses indicate that delayed drivers had fewer crashes but more convictions than drivers who did not delay getting their license.

To summarize the key findings:

- The rate of crashes per year among GDEC drivers is lower than that of non-scholarship drivers. Furthermore, GDEC drivers, on average, scored slightly higher on their Road Skills Tests than their non-scholarship counterparts.

- Drivers who had behind-the-wheel training with an approved instructor were involved in fewer crashes, fewer crashes with serious injuries or fatalities, and fewer convictions.
- Drivers who received classroom instruction were involved in fewer convictions than those who received online instruction.
- Drivers waiting until age 18 to obtain a license and who were therefore not required to complete the driver's education requirements had fewer crashes but more convictions than drivers who did not delay getting their license.

Recommendations

Implications from this study, as described above, may be translated into actionable recommendations to both improve the study and to further the larger goals of maximizing participation in driver's education and training and crash reduction in the state of Georgia. The enactment of Joshua's Law, with its enhanced requirements for teen drivers to complete an approved driver's education course and a supervised driving experience, and the subsequent creation of the GDEC scholarship program to make driver's education courses more accessible and affordable, were critical steps towards meeting these goals.

Given the finding that GDEC scholarship drivers are involved in fewer crashes and also score higher on average on the Road Skills Test, consideration should be given to increasing funding so that more GDEC scholarships could be awarded. This would be in line with the provision in Joshua's Law that GDEC may recommend changes to state programs, budgets, and standards as they relate to these matters. By continuing to leverage the positive outcomes associated with participation in the GDEC scholarship route to driver's education completion, the GDEC would be working directly to maximize both participation in driver's education training and crash reduction.

This study found that young drivers who completed behind-the-wheel training with an approved instructor were involved in fewer crashes, fewer crashes with serious injuries or fatalities, and had fewer convictions than their peers who did not receive this type of instruction. GDEC should consider making a recommendation to restructure Joshua's Law to require behind-the-wheel instruction with an approved instructor to supplement supervised driving with a parent or guardian for all methods.

Consideration should be given to what aspects of the classroom instruction could be better replicated in the online learning environment, based on the finding that student drivers who received classroom instruction received fewer convictions than those who received online instruction. This should include an assessment of the various aspects of instruction that are provided by the two course environments and how they differ, as well as what aspects of the online course might be modified to better incorporate elements of classroom instruction that contribute to better student engagement, comprehension, learning outcomes, and information retention.

The differences of delayed licensure in driving incident outcomes would benefit from further exploration, given the limitations of this study. A more robust study could involve collecting information about individual driving behavior to control for different driving behaviors between the study groups. This approach would allow for a deeper examination of the effects of delaying obtaining a driver's license than the current study allowed. Such a study could provide stronger support for the current findings that delayed licensure was associated with fewer crashes but more convictions and, if these findings hold, could shed some light on why this might be the case.

To summarize the study recommendations:

- Given that GDEC drivers are involved in fewer crashes and score higher on average on the Road Skills Test, consider increasing funding to award more GDEC scholarships.
- Since behind-the-wheel training with an approved instructor has safer driving outcomes, GDEC should consider making a recommendation to restructure Joshua's Law to require behind-the-

wheel instruction with an approved instructor to supplement supervised driving with a parent or guardian for all methods.

- Since classroom instruction is associated with fewer convictions than online instruction, online instruction providers should examine the extent to which the approaches used in the classroom and virtual settings differ and consider modifying online systems to better incorporate practices used in the classroom.
- Consider further exploration of delayed licensure through a study that collects individual driving behavior to control for different driving behaviors between the study groups to examine why delaying obtaining a license is associated with fewer crashes but more convictions.

Study Limitations

It is important to acknowledge the limitations of this study to fully understand the scope of these findings and to identify avenues for future research. While many of the limitations in this study relate to what data were available and the quality of the data fields provided, some limitations were due to factors outside the scope of the data.

The first limitation relates to how the availability and completeness of the data impacted the construction of the comparison samples. Creating comparison groups that are as similar as possible is important to reduce the likelihood that any differences in outcomes are due to differences between the groups, rather than the factor under investigation (e.g., completing the GDEC scholarship program, method of completing the GDL requirement, delaying licensure). However, the data available for creation of the comparison groups were limited. Information on drivers' race was unavailable for over 60 percent of the potential drivers in the data, which resulted in comparison groups containing larger percentages of cases with unknown racial designations. Additionally, the other demographic information available for matching was limited and no indicator for socioeconomic status was available for control. Prior studies have found that scholastic achievement, measured by indicators such as grade point average (GPA), is associated with differing driving outcomes.[14] Thus, GPA may have been a good matching criterion to include, but this information was not available. Another factor that would strengthen the analysis would be controlling for driving exposure. Being able to match the driving experience of the comparison groups would strengthen the case for differences in driving outcomes being due to the factors under investigation.

The comparisons were affected by more than just the available data. When comparing the groups by differing methods of completing the GDL requirements, it is important to consider that drivers self-selected which method they used to complete the requirements versus being randomly placed in a method, which would model a true experimental research design. The factors behind which method drivers selected (which might include socioeconomic status, accessibility of internet, availability of driving schools in an area, or other factors) could introduce potential group differences that cannot be controlled for when matching on basic demographics.

Along similar lines, the decision to delay licensure might also involve factors beyond basic demographics. These unmeasured factors could result in different driving behaviors. This comparison would also be strengthened by controlling for length of driving experience, which could only be approximated in the study by age. Additionally, it would have been informative to look at the driving outcomes at a more granular level, breaking out the delayed group by first licensed at age 18, at age 19, and at age 20 or older. However, the method used to mask the data provided for analysis did allow for the necessary precision in identifying drivers' ages.

The inability to determine whether a driver involved in a crash was at-fault or not is another limitation of this study. The information provided in the crash dataset did not provide complete or reliable information on whether or not the young driver involved in the crash was at-fault. Therefore, conclusions cannot be drawn about whether the young drivers caused the crash either by their actions or failure to act.

[14] e.g., McKenna, C. K., B. Yost, R. F. Munzenrider, and M. L. Young. 2000. An evaluation of driver education in Pennsylvania. Harrisburg, PA: Pennsylvania Department of Transportation.

Appendices

Appendix A: Supplemental Background Tables

This section of the Appendix contains additional data tables referenced in the main body of the report.

Fatal Crashes by OMB Rural/Urban Classification

The Crash Trend Section of the report provided the number of fatal crashes involving young drivers broken out by the rural or urban classification of the segment of the trafficway on which the crash occurred based on Federal Highway Administration (FHWA)-approved adjusted Census boundaries of small urban and urbanized areas. In other words, it provided crash fatalities by the road classification, rather than the county type. Thus, a fatal crash that occurred on a rural road in an urban county would have been classified in that data as "rural."

The table below provides the fatal crashes involving young drivers broken out by the rural or urban classification according to the Office of Management and Budget (OMB) classification of the county. This is the county designation used throughout the other sections of this report.

Table A1. Young Drivers Involved in Fatal Crashes by Rural or Urban OMB County Classification (2010-2019)

Year	OMB County Classification			
	Urban		Rural	
	15-17	18-20	15-17	18-20
2010	32	84	26	30
2011	32	79	17	31
2012	25	81	9	39
2013	34	84	13	25
2014	38	69	14	24
2015	33	79	13	40
2016	29	100	16	37
2017	34	86	15	53
2018	34	109	9	40
2019	29	91	19	30

Tables A2 and A3 below provide the same crash data as Figure 4 in the Crash Trend Section of the report and Table A1 above, but also broken out by gender.

Table A2. Young Drivers Involved in Fatal Crashes by Rural or Urban Road Type and by Gender (2010-2019)

NHTSA Road Type Classification Based on Land Use*								
Year	Urban				Rural			
	15-17		18-20		15-17		18-20	
	Male	Female	Male	Female	Male	Female	Male	Female
2010	15	8	46	24	25	10	28	16
2011	14	10	37	13	20	5	41	17
2012	11	9	40	22	7	7	43	15
2013	18	9	47	15	10	10	34	13
2014	21	11	39	18	13	7	23	13
2015	17	7	42	25	10	12	38	14
2016	20	6	63	27	9	10	33	14
2017	19	13	65	19	14	3	39	16
2018	17	13	68	30	6	7	36	15
2019	19	7	52	27	16	6	31	11

* Two individuals in 2011 (one male and one female) had reports with unknown road type classifications

Table A3. Young Drivers Involved in Fatal Crashes by Rural or Urban OMB County Classification and by Gender (2010-2019)

OMB County Classification*								
Year	Urban				Rural			
	15-17		18-20		15-17		18-20	
	Male	Female	Male	Female	Male	Female	Male	Female
2010	22	10	58	26	18	8	16	14
2011	20	12	61	18	14	3	18	13
2012	12	13	56	25	6	3	27	12
2013	21	13	63	21	7	6	18	7
2014	24	14	50	19	10	4	12	12
2015	20	13	53	26	7	6	27	13
2016	20	9	70	30	9	7	26	11
2017	24	10	66	20	9	6	38	15
2018	19	15	78	31	4	5	26	14
2019	20	9	63	28	15	4	20	10

GDEC Scholarship Program Information

The table below provides a detailed description of the number of GDEC scholarship program applications, awards, graduates, and scholarships redeemed.

Table A4. GDEC Scholarship Program Applications, Awards, and Graduations

	2017	2018	2019
Applications	5,487	11,836	9,487
Tier 1 Applicants	3	5	4
Tier 2 Applicants	2,833	5,963	4,924
Tier 3 Applicants	2,651	5,868	4,559
Scholarship Awarded	5,487	5,585	5,631
Tier 1 Awards	3	5	4
Tier 2 Awards	2,833	4,002	4,501
Tier 3 Awards	2,651	1,578	1,126
GDEC Program Graduates	5,011	4,826	5,011
GDEC Authorized Providers	53	61	62
Total value of scholarships redeemed	$1,958,030.20	$1,951,417.87	$1,958,030.20

Appendix B: Methodology

Data Sources

Georgia Driver's Education Commission (GDEC) Applicant Data

Data were obtained from the GDEC application database on all student applicants applying for the GDEC scholarship to receive driver training and education between February 1, 2017 and December 31, 2019. The GDEC data provided the personally identifiable information (PII) of nearly 31,200 applicants, in addition to demographic characteristics, tier categorization, and application status. If applicants were awarded a GDEC scholarship, additional variables such as program completion status and provider detail (location and description of where the applicant received their driver training) were provided.

Crash Data

Data were obtained from the Georgia Department of Transportation's (GDOT) Georgia Electronic Accident Reporting System (GEARS). All motor vehicle crashes involving young drivers ages 15-23 years between January 1, 2017 and December 31, 2019 were extracted from GEARS. The GDOT data provided the PII of nearly 321,000 young drivers who were involved in crashes on Georgia public roadways and private property (e.g., parking lots, private streets, etc.). The PII obtained from the crash data included young driver full name, date of birth, driver license number, and state that issued the license. In addition to the descriptive information about the crash, details regarding the vehicles and vehicle occupants involved in each crash were also provided.

Licensing History and Driving Record Data

The licensing history and driving record for young drivers ages 15-23 years involved in motor vehicle crashes between January 1, 2017 and December 31, 2019 and GDEC scholarship applicants were obtained from the Georgia Department of Driver Services (DDS). DDS records were obtained using the PII of the young drivers based on the exact match of the driver license number, date of birth, and name (first and last). For each identified person, DDS provided variable fields for the written test scores, Road Skills Test scores, class of each license issued, date of licensure, the method used to complete the GDL requirement[15] (if available), and type of provider the young driver used to receive the driver's education and training. DDS also provided conviction and suspension information for each violation since the licensure of each driver.

DDS also provided approximately 890,000 redacted record summaries for other young drivers ages 15-23 years who obtained a license between 2017 and 2019 in Georgia that did not match the PII records provided. The records' summaries included demographic information used for one-to-one matching to design the research cohorts (i.e., month and year of birth to calculate relative age, gender, race (if known), county of residence, and the method used to complete GDL requirement). For these redacted records, DDS provided the license class and issue date for the latest license obtained by the drivers. Therefore, the license information available in the redacted dataset may not necessarily be the first license obtained by the driver. To address this limitation, the driver's age and conviction history at the time of licensure were used to determine their eligibility for specific license classes. DDS also provided the total number of convictions and suspensions for these drivers, along with the method used to complete the GDL requirement (if available).

[15] See pages 5 and 6 for a description of Joshua's Law and the Graduated Driver Licensing (GDL) requirements

Data Linkage Process

The multi-step dataset linkage process was conducted in a secure cyber environment within the Crash Outcome Data Evaluation System (CODES) program at the Georgia Department of Public Health Injury Prevention Program.

CODES extracted all PII for young drivers ages 15-23 years involved in a motor vehicle crash between 2017 and 2019 from the GDOT crash database. CODES prepared the PII data fields to prepare for the data linking process. After receiving GDEC applicant information, CODES identified all GDEC applicants (approved and rejected) that were involved in motor vehicle crashes by deterministic linking using the driver's license (or learner's permit) number. Of those that did not successfully link on the driver's license number only, a probabilistic linking method was employed using the first name, last name, and date of birth. If available, CODES used additional variables such as county of residence in the probabilistic linking method. To increase the probability of a successful linkage, CODES verified true matches of the outputs of both linking methods.

Next, CODES prepared the input PII variables with unique DPH identification numbers (IDs) for DDS to use to extract the driver's licensing and history information for GDEC applicants and young drivers involved in crashes. In order to optimize the number of successful records identified in the DDS database, CODES allowed multiple records for individuals identified with multiple crashes and/or who had differences in PII fields (e.g., misspelling of names and/or erroneous entry of driver's license number) or incomplete information. These duplicated records for these individuals either included all PII variables (first/last name, date of birth, and license number) or at least two of the PII variables. DDS provided information for successful matches for the PII fields provided – missing PII information was excluded in the deterministic linking outcomes. DDS provided the remaining PII information for those records that matched with incomplete information to assist with the deduplication and validation of records.

After receiving the output from DDS, CODES removed duplicated records. CODES prepared the redacted Master File with unique IDs for each person across all data sources (GDEC IDs, DPH IDs, and DDS IDs). CODES sent the redacted Master File, DDS, and crash data to the Georgia Driver's Education Commission (GDEC) contracted epidemiologist. The epidemiologist used the Master File to prepare the GDEC, Crash, and Driving Record datasets for the study conducted by Strategic Research Group.

Data Elements Used in the Analysis

The table below provides the descriptions of the demographic variables used to create the comparison groups as well as the descriptions of the outcome variables.

Table B1. Description of Data Variables used in the Analysis

Demographic Variables	**Description**
Gender	Indicates if driver is male or female
Race	Indicates driver's race
Age at end of study	Indicates driver's age at 1/1/2020
County	Driver's county of residence
County type	Indicates if driver's county of residence is rural or urban
Scholarship	Indicates if driver received a GDEC scholarship and completed GDL requirements
Method	Method driver used to meet GDL requirement (1 - 4)
Outcome Variables	**Description**
Road Skills Test scores	Driver's Road Skills Test score
Total points†	Total number of points on the driver's record
Conviction (Y/N)	Indicates if the driver has received a conviction (yes or no)
Number of Convictions†	Total number of convictions including suspensions accrued by the driver
Suspensions	Total number of suspensions
Revocations	Total number of revocations
Suspend revoked	Indicates whether the driver's license has been suspended or revoked (yes or no)
Number of Crashes†	Total number of crashes
Crash (Y/N)	Indicates if the driver has been involved in a crash (yes or no)
Crash with serious injury or fatality (Y/N)	Indicates if driver was involved in any crash which resulted in a serious injury or fatality (yes or no)
Total fatalities in crashes*	Total number of fatalities which were the result of crashes involving the driver
Total fatalities and serious injuries	Total number of fatalities and serious injuries which were the result of crashes involving the driver

*For some results, this number was represented as 'Total fatalities per 1,000 individuals'
† For some results, this number was represented as 'Incidents per year' (e.g., Crashes per year)

Comparison Groups

To adequately answer the research objectives of interest, it was necessary to create several driver cohorts to be examined and compared. In the creation of the driver cohorts, the goal was to ensure that the appropriate cohorts were developed to achieve the research objectives, which included ensuring comparison groups were as equivalent as possible. This allowed for the analysis to estimate the effect of the treatment (e.g., scholarship completion or GDL method) without the influence of other demographic factors that might also influence the outcome variable. To achieve the demographically similar comparison groups, individual drivers from the treatment group (e.g., delayed licensure group, a GDL

method group, or GDEC scholarship drivers) were matched on important characteristics with drivers from the control group to obtain demographically similar groups. The control variables used differed slightly between cohorts, but generally included race (when known), county of residence (or rural/urban type if no exact county match existed), age, and gender. The details of the construction of each cohort are provided below.

A. Comparison Groups for GDEC Scholarship Recipients who Completed the Program Compared to Other Young Drivers Analysis (**Research Objective 1**): For this analysis, drivers were not matched at a 1-to-1 ratio. Drivers were instead grouped into two cohorts:

    1. the population of GDEC scholarship recipients who completed the program and who qualified as Tier 2 under the reported income, and
    2. the population of applicants who did not receive a scholarship based on random selection from among the Tier 2 applicants who qualified as Tier 2 under the reported income.

    Among Tier 2 applicants, awardees of the GDEC scholarships are randomly selected. This means that being selected (or not) for an award should not introduce differences between the groups. While these cohorts were not matched 1-to-1 demographically, the table below provides the demographics of each group as well as the group sizes. The two cohorts were very similar demographically, which was important to reduce the possibility that any differences in driving outcomes were due to factors other than completion of the GDEC scholarship program.

Table B2. Demographics of Comparison Groups for Research Objective 1

Demographics		**TIER 2 GDEC Scholarship** (Awarded & Completed Program)		**TIER 2 Non-GDEC** (Not-awarded)	
Gender	Male	4,555	44.2%	1,002	43.3%
	Female	5,731	55.6%	1,304	56.4%
	Unknown	13	0.1%	6	0.3%
Race	Minority	2,692	26.1%	666	28.8%
	Non-Minority	2,044	19.8%	541	23.4%
	Unknown	5,563	54.0%	1,105	47.8%
Region	Rural	1,588	15.4%	320	13.8%
	Urban	7,099	68.9%	1,612	69.7%
	Unknown	1,612	15.7%	380	16.4%
TOTAL		**10,299**	**100%**	**2,312**	**100%**

B. Comparison Groups for Method to Complete the GDL Requirement Analysis (**Research Objective 3**): For this research objective, six comparisons were conducted with different sets of groups of young drivers who completed the GDL requirement using the different methods. A set of comparison groups were created to individually analyze each method against the other methods, resulting in the

creation of twelve groups total for method comparisons. In each case, individuals from the method with the smallest number of cases were randomly matched to individuals from the larger group on age, gender, race (when known), and either exact county or county type (urban/rural) when an exact county match was not possible. Drivers were matched in a 1-to-1 ratio. It should be noted that drivers self-selected which method they used to complete the GDL requirements. Therefore, it is possible that this self-selection could introduce differences between the groups on factors beyond the demographics used as matching criteria. This issue is discussed in the Study Limitations section of the report.

Table B3. Demographics of Comparison Groups for Research Objective 3

Demographics		**Method Comparison**					
		1v2	**1v3**	**1v4**	**2v3**	**2v4**	**3v4**
Gender	Male	50.5%	46.2%	48.5%	47.6%	50.4%	46.2%
	Female	49.5%	53.8%	51.5%	52.4%	49.6%	53.8%
	Unknown	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Race	Minority	11.3%	16.4%	13.2%	12.9%	11.3%	16.4%
	Non-Minority	45.3%	38.4%	40.7%	40.5%	45.3%	38.4%
	Unknown	43.5%	45.2%	46.1%	46.6%	43.5%	45.2%
Region	Rural	25.9%	15.3%	17.5%	16.3%	25.9%	15.3%
	Urban	74.1%	84.7%	82.5%	83.7%	74.1%	84.7%
	Unknown	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
TOTAL		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Group Size		23,515	17,828	155,499	16,784	23,518	17,831

C. Comparison Groups for Delayed Licensure Analysis (**Research Objective 4**): For this research objective, the delayed licensure group consists of individuals whose first license is a Class C license and there is no indication they ever had a provisional license. In order to help ensure that this cohort did not include young drivers who may have obtained a class D-type equivalent license from another state, the date of each young driver's Road Skills Test was examined to identify any drivers with a Class C license but no indication of having taken a Road Skills Test. The comparison group was demographically similar to the delayed licensure group and was created by randomly matching drivers in a 1-to-1 ratio on gender, race (when known), and either exact county or county type (urban/rural) when an exact county match was not possible. All of the drivers in the non-delayed group that was matched with the delayed licensure group had held a Class D license for at least six months. Drivers were not matched on exact age but instead matched with a delayed driver approximately two years older. The table below provides the demographics of the delayed and comparison cohorts as well as the group sizes.

Table B4. Demographics of Comparison Groups for Research Objective 4

Demographics of cohorts			
Gender	Male	38,561	53.3%
	Female	33,796	46.7%
Race	Minority	25,879	35.8%
	Non-Minority	11,127	15.4%
	Unknown	35,351	48.9%
Region	Rural	11,744	16.2%
	Urban	60,613	83.8%
TOTAL		**72,357**	**100%**

Appendix C: Results

To answer each research objective in this study, analyses were conducted of the differences in the prevalence of outcome variables between two or more cohorts being compared. Independent sample t-tests and Analysis of Variance (ANOVA) tests[16] were used to compare the differences of means on each outcome variable between two or more studied cohorts to determine if there were differences in outcomes (i.e., the difference between the average number of times a crash or a conviction occurred within each cohort). Differences between groups were considered statistically significant at a 95 percent confidence level, so anything with p-value less than 0.05 is a statistically significant difference. Statistically significant differences are likely attributable to the effect being studied because the cohorts being compared were designed to control for demographic differences.

The tables below provide the results of the difference of means tests for each research objective and include the groups compared, the type of statistical test used, the outcomes examined, the mean of each outcome for each group, the p-value (which signifies a statistically significant difference if ≤ 0.05), and the percentage difference if the difference is significant.

Table C1. Outcome Analysis for Research Objective #1

Groups Compared: GDEC Scholarship vs. Non-awarded; Analysis: independent t-test				
Driving Outcomes	**GDEC Average**	**Non-GDEC Average**	**P-Value**	**Percentage Difference**
Crashes per Year	0.0937	0.108	0.021	14.0%
Road Skills Test Scores	86.1	85.5	0.015	0.7%
Conviction (Y/N)	0.0639	0.0580	0.274	-
Convictions per Year	0.0374	0.0406	0.421	-
Crash (Y/N)	0.155	0.167	0.191	-
Accumulated Points per Year	0.0671	0.0703	0.700	-
Crash with serious injury or fatality	0.00291	0.00173	0.244	-
Suspensions	0.0216	0.0229	0.794	-

* Fatal crash outcomes were not included in the analysis because these events were too rare to provide meaningful results

[16] The use of difference of means tests over regression was driven by the limited nature of complete demographic data as controls, with county (of which Georgia has 159) being one of the primary demographic controls available. Consideration was also given to readability of the results for the intended audience.

Table C2. Outcome Analysis for Research Objective #2

Groups Compared: GDEC Provider Type; Analysis: ANOVA				
Driving Outcomes	**Provider Type among GDEC Authorized Providers**			**P-Value**
	Technical College Average	**High School Average**	**Private/ Commercial Average**	
Number of Crashes	0.259	0.225	0.248	0.269
Crash (Y/N)	0.215	0.191	0.204	0.231
Number of Convictions	0.119	0.0989	0.106	0.231
Total Fatalities & Serious Injuries	0.00582	0.00486	0.00342	0.254
Accumulated Points	0.216	0.182	0.198	0.433
Suspensions	0.0151	0.0146	0.0177	0.541
Road Skills Test Scores	86.4	86.3	86.1	0.285

Table C3. Outcome Analysis for Research Objective #3

Groups Compared: Method 1 vs. Non- Method 2 Analysis: independent t-test				
Driving Outcomes	**Method 1 Average**	**Method 2 Average**	**P-Value**	**Percentage Difference**
Crash (Y/N)	0.262	0.271	0.017	3.6%
Number of Convictions	0.467	0.556	0.000	17.3%
Number of Crashes	0.329	0.339	0.086	-
Total Fatalities & Serious Injuries	0.00213	0.00293	0.119	-
Total Fatalities Per 1,000 Individuals	0.0425	0.0851	0.564	-

Table C4. Outcome Analysis for Research Objective #3

Groups Compared: Method 3 vs. Non- Method 4 Analysis: independent t-test				
Driving Outcomes	**Method 3 Average**	**Method 4 Average**	**P-Value**	**Percentage Difference**
Crash (Y/N)	0.255	0.274	0.000	7.1%
Number of Crashes	0.319	0.352	0.000	9.8%
Number of Convictions	0.463	0.553	0.000	17.7%
Total Fatalities & Serious Injuries	0.00247	0.00275	0.747	-
Total Fatalities Per 1,000 Individuals	1.29	1.46	0.710	-

Table C5. Outcome Analysis for Research Objective #3

Groups Compared: Method 1 vs. Non- Method 3 Analysis: independent t-test				
Driving Outcomes	**Method 1 Average**	**Method 3 Average**	**P-Value**	**Percentage Difference**
Number of Convictions	0.425	0.463	0.003	8.5%
Crash (Y/N)	0.256	0.255	0.818	-
Number of Crashes	0.324	0.319	0.504	-
Total Fatalities & Serious Injuries	0.00179	0.00129	0.292	-
Total Fatalities Per 1,000 Individuals	0.110	0.110	1.000	-

Table C6. Outcome Analysis for Research Objective #3

Groups Compared: Method 2 vs. Non- Method 4 Analysis: independent t-test				
Driving Outcomes	**Method 2 Average**	**Method 4 Average**	**P-Value**	**Percentage Difference**
Number of Convictions	0.556	0.608	0.000	9.1%
Crash (Y/N)	0.271	0.272	0.804	-
Number of Crashes	0.339	0.350	0.059	-
Total Fatalities & Serious Injuries	0.00578	0.00442	0.187	-
Total Fatalities Per 1,000 Individuals	2.93	2.38	0.311	-

Table C7. Outcome Analysis for Research Objective #3

Groups Compared: Method 1 vs. Non- Method 4 Analysis: independent t-test				
Driving Outcomes	**Method 1 Average**	**Method 4 Average**	**P-Value**	**Percentage Difference**
Number of Crashes	0.313	0.348	0.000	10.5%
Crash (Y/N)	0.250	0.272	0.000	8.3%
Number of Convictions	0.405	0.560	0.000	32.0%
Total Fatalities & Serious Injuries	0.00179	0.00255	0.000	35.0%
Total Fatalities Per 1,000 Individuals	0.116	0.167	0.302	-

Table C8. Outcome Analysis for Research Objective #3

Groups Compared: Method 2 vs. Non- Method 3 Analysis: independent t-test				
Driving Outcomes	**Method 2 Average**	**Method 3 Average**	**P-Value**	**Percentage Difference**
Number of Crashes	0.332	0.313	0.005	5.8%
Crash (Y/N)	0.267	0.251	0.001	6.3%
Number of Convictions	0.509	0.456	0.000	11.0%
Total Fatalities & Serious Injuries	0.00238	0.00137	0.046	54.0%
Total Fatalities Per 1,000 Individuals	0.0596	0.119	0.564	-

Table C9. Outcome Analysis for Research Objective #4

Groups Compared: delayed vs. Non-delayed; Analysis: independent t-test				
Driving Outcomes	**Non-Delayed Average**	**Delayed Average**	**P-Value**	**Percentage Difference**
Number of Crashes	0.347	0.153	0.000	77.7%
Crash (Y/N)	0.270	0.120	0.000	77.3%
Number of Convictions	0.438	0.788	0.000	57.1%
Total Fatalities & Serious Injuries	0.00184	0.000774	0.000	82.0%
Total Fatalities Per 1,000 Individuals	0.124	0.0553	0.197	-

Appendix D: Literature Review

The need to evaluate driver's education programs and graduated driver licensing, among other related elements in preparing individuals to drive, has been identified for some time (Tarrants, 1970). While some work has been done to evaluate the impact of the Teenage & Adult Driver Responsibility Act (TADRA) of 1997 in Georgia (Rios et al., 2006; Thompson, McGee, & Feng, 2016), few evaluation efforts to date have attempted to examine the impact of the driver's education component and, more specifically, the impact of the GDEC scholarship program. In order to understand how to examine driver's education programs holistically, as well as the scholarship program specifically, we must first understand the impact of Joshua's Law on Georgia driver's education programs and existing research regarding how demographic variables, driving-related variables, and driver's education program variables contribute to increases or reductions in negative driving outcomes, such as crashes and citations.

Joshua's Law

In 2005, Georgia adopted Senate Bill 225, also known as Joshua's Law, to change teen driver requirements with the goal of improving teen driver safety. While a graduated driver licensing system had been in place in Georgia since the Teenage & Adult Driver Responsibility Act (TADRA) of 1997, Joshua's Law included a requirement for driver's education to supplement existing licensure requirements. It required completion of an approved driver's education course and the completion of 40 hours of supervised driving, including six hours of night driving.

While education requirements were intended to improve driver safety, they brought with them another potential impact: that of cost. Driver's education courses require materials, instructors, and driving opportunities, which in turn means fees for driver education. While in some cases, such as driver's education courses provided by schools, costs can be subsidized to an extent, commercial driving schools require students and their families to pay a fee for service. Commercial driver's education courses can cost hundreds of dollars, which can be a significant barrier to students and families of lower socioeconomic status.

In 2017, the Georgia Driver's Education Commission (GDEC), also created by the adoption of Joshua's Law, launched a scholarship program to assist students seeking to complete a driver's education program. The scholarships are available to students ages 15-17 years who will complete a course that meets the requirements for 30 hours of classroom instruction and six hours of behind-the-wheel instruction. Awards are tiered, with the first tier including children/dependents of public safety professionals or members of the U.S. military killed in the line of duty. The second tier is need-based, with eligibility based on 125 percent of the free and reduced price school meal threshold for the state of Georgia. The third tier includes all applicants who do not meet the criteria for the first two tiers. Distribution for Tier 2 and Tier 3 require allocation to be evenly distributed among Georgia's U.S. congressional districts. Tier 1 is relatively small, applicants have generally been fewer than five per quarter. Tier 2, depending on the number of applicants, may be fully or partially funded. Tier 3 cases are funded in times where scholarships are not fully taken by Tier 2, but may not be fully funded.

Negative Outcomes as Related to Demographic and Individual-Level Variables

An understanding of the relationship between negative driving outcomes, such as crashes and citations, and the demographic variables of drivers could help specific programs to identify populations at greater risk in order to engage them in their educational programs. In an evaluation using secondary data

sources, Shell et al (2015) examined the role of a myriad of demographic variables (i.e., age, ethnicity, gender, rural/urban residence, age driving permit was received, and estimated median household income) related to citations and crashes. They found that driver's education alone improved negative outcomes regardless of other demographic considerations during the first two years of driving. Similarly, Romano, Fell, and Voas (2011) found that GDL laws had benefits across all races and ethnicities, but noted specific benefits among certain groups for alcohol-related or speeding-related crashes. This evaluation is also noteworthy because they chose to focus on drivers who were fatally injured in single-vehicle crashes, as the assumption is that these are cases in which the driver bore the sole responsibility for the crash. The work by af Wåhlberg (2018) also noted this issue and the challenge in determining culpability, which should be a consideration in evaluations since crashes in which the young driver being evaluated is not at fault could be a confounding factor.

Similarly, Paz-Cruz and Copeland (2014) analyzed variables such as how long the person had been driving, age, number of "close calls" or near crashes, number of times pulled over, number of police warnings, and number of tickets received, as associated with an increased likelihood of crashes. While they found modest connections between less driving experience, greater age, and number of times pulled over and crashes, their predictors only accounted for about 15 percent of the likelihood of getting into a crash. Thus, although studies have found significance when examining the role of demographic variables and other driving-related variables on the likelihood of being involved in a crash, individual demographic variables, rather than the set as a whole, seem to more often contribute to stronger findings in terms of crash predictions

Impact of Driver's Education Programs on Reducing Negative Outcomes

Demographic and driving-related variables alone should not be the only considerations in examining negative driving outcomes. The driver's education program itself could provide important information in understanding how an individual was trained to engage behind the wheel. Understanding driver's education program impact in terms of mode of delivery, sponsoring institution, quality, and type of driver engagement during the education process could provide insight into certain driver's education program qualities being significantly beneficial in reducing negative outcomes.

While a program-specific evaluation, the work by Hanover Research (2008) and Fleisher et al. (2016) compared results by high school, and Hanover Research also examined whether the driver's education was provided through a commercial program or high school. Consideration by high school (or the location the program is provided) could indicate issues with program delivery but could be confounded by the socioeconomics of different schools or differing demographics. However, they did also attempt to account for some of this by comparing public school programs to commercial programs within the same area.

While not directly related to the structure of this evaluation, Anker (1979) evaluated summer school versus semester-long, in-school driver's education programs in terms of crash involvement and found that summer school students were more likely to be crash-involved. The conclusion drawn was that a summer school program, which is shorter, may have not equipped students as well for driving. Masten and Chapman (2004) looked at home-study versus classroom driver's education, with a focus on knowledge and attitudes toward driving. The evaluation used the state-proctored exit examination following the driver's education course, as well as the state DMV written knowledge test, to capture their data. Even though the technology at the time was not as robust as what is available today, they

found online/computer-based driver's education students performed as well or better on exit exams and safe driver attitude measures, while classroom students did better on written knowledge tests from the DMV.

Some evaluations of driver's education focus on knowledge, attitudes, and behaviors that are presumably instilled by driver's education programs. These data are most commonly gathered through the administration of surveys and may be indicators of driver improvement that are missed through more concrete outcomes such as crashes and violations. Additionally, some knowledge information could potentially be gathered through the results of road test or written examination results, if such data were available. Paz-Cruz and Copeland (2014) conducted a survey as a part of their evaluation which asked them to rate the quality of their driver's education, and it also focused on the frequency with which they engaged in risky driving behaviors such as driving under the influence, using a cell phone or texting, or driving while sleepy. The work of Mayhew et al. (2014) found through their survey data that driver's education was correlated with greater driving knowledge and a reduction in self-reported risky driving behavior, but had mixed results regarding the effect upon collision involvement.

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