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Project Title

Assessing Teen Driver Safety Interventions: Graduated Driver Licensing and Parent Advisory Letters

University

North Dakota State University

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Research Needs

Teen drivers are disproportionately over-represented in North Dakota crashes, with teens accounting for only 4% of the driver population and accounting for 10% of crashes (Vachal and Malchose 2009). Statewide crash figures show teen drivers were involved in 26% injury crashes between 20012 and 2016. The ND Department of Transportation (NDDOT) has identified teen drivers as an emphasis area in the Strategic Highway Safety Plan (2018).

A large share of teen crashes occurs within the first year after licensure due to a lack of driving experience. Reducing crash incidence, in particular those that result in injury or fatality, is an ongoing struggle for agencies tasked with reducing crashes and making our roads safer. Teen drivers are an at-need group with regard to driver safety. The ability to effectively improve safety performance for these drivers at the population level as well as among at-risk individual drivers is valuable to public safety.

Understanding the nature of these crash events enhances the ability of stakeholders to select interventions that most successfully mature these notice drivers. The learning curve at this point in their driving history is still large, which makes teen drivers more susceptible to these interventions. These interventions could limit novice driver risk exposure and/or change individual driver's behavior, ultimately reducing the number of crashes.

Graduated driver licensing (GDL) and other population-based driver improvement programs have shown promise as tools for reducing teen crash risk (Curry et al, 2017). North Dakota's initial five years of experience with since adoption of a GDL provide a learning point to understand policy impacts locally. The GDL is seen as an evolving intervention with policy and administrative elements that can be refined based on the environment, risk factors, and safety outcomes for teen drivers in the state. For instance, the recognition of distracted driving as a risk

factor has grown substantially since the ND law was enacted (Carney, Harland and McGee, 2018; Gershon et al., 2017; McCartt and Teoh, 2015).

In addition, real-time performance-based interventions at the driver level offer a potential supplement for targeting the highest risk teen drivers. Crash risk markers, or predictors, may be used in a preventative intervention such as an advisory letter to parents or warning letters to teen drivers who exhibit the risk markers, hopefully, altering their behavior and reducing their likelihood of crash involvement (Jones, 1997; Kaestner, Warmoth, & Syring, 1965; Masten, 2004; Strathman, 2007; McBride & Peck, 1970). Parental involvement that may result from these letters, however, has shown to be positively related to teen driver safety in terms of crash outcomes. Specific training or education requirements attached to licensure may also be an intervention strategy, but would be beyond the bounds of administrative agency authority in most cases.

Using North Dakota driver's licensing data and crash data, survival analysis identified gender, traffic convictions, rural/urban resident, and involvement in previous property-damage-only (PDO) crashes as markers that are significant in predicting future injury and fatal crashes among teen drivers (Malchose and Vachal, 2010). Findings showed living in an urban area increased risk of being in an injury or fatal accident within the first year after attaining your license by 2.5 times compared to drivers who live in rural areas. Drivers involved in a previous PDO crash were 25 times more likely to be involved in an injury or fatal crash than those not involved in a previous PDO crash. Using empirical findings in actionable efforts, such as the parent advisory letter for at-risk teens, is an example of continued innovation to improve public safety. An update to this predictive model is valuable in continued efforts to prevent teen crashes at the driver level.

Research Objectives

The goal of this project is to conduct assessments of two safety interventions for teen drivers aimed to improved public safety. One intervention is administered at the population level and the other at the driver level. The project objectives to:

1) Assess a parent advisory letter pilot to assess efficacy as an at-risk teen driver intervention based on an updated teen driver risk model and parent program response.

2) Investigate the public safety effects of the graduated driver licensing policy North Dakota since enacted in 2012, in terms of crash and citation outcomes.

3) Study key risk markers in early GDL licensure phase for improved teen driver safety program delivery via the state's Vision Zero initiative.

Research Methods

Assessment 1: This intervention is at the driver level. A pilot project will be conducted as a proof-of-concept for using driver records to target high risk teens in reducing crash morbidity and mortality. Building on findings from the Malchose and Vachal (2010), an updated a Cox regression survival model and more recent crash and citation data will be studied to identify the group of teenagers at-need for intervention. Teen driver records will be analyzed to identify risk

factors based on citation and crash events. An early parent survey will be conducted to understand parent perceptions and actions regarding teen driver restrictions and/or training; and if the NDDOT parent advisory letter had an effect on parent perceptions/actions. Experimental design will define control and intervention cohorts in North Dakota teen driver population, based on specific moving violation citations or/and property-damage-only crash involvement. The cohort definitions will be informed by the 2010 study and ultimately defined by the NDDOT. A follow-up parent survey will be conducted to assess modifications to the parent letter, resources and timing for NDDOT advisement regarding teen driver risk.

Assessment 2: This intervention is at the population level will be conducted based on resources available after assessment for the new driver level intervention. Teen driver crash records will be studied with regard to the effects of GDL policy adopted to include: 1) provisional driving age, 2) minimum holding period/experience and 3) night time driving restrictions on the population. Recommended GDL components that have been omitted will also be studied (CDC).[1] Regression analysis will be used to model GDL policy effects considering pre and post policy periods of five years. The influence of the GDL program on teen driver safety outcomes in North Dakota will provide insight needed to make performance-based decisions regarding GDL program components on crash incidents involving teen drivers.

Expected Outcomes

This research will contribute to an ongoing effort to improved public safety by preventing teen driver crashes. Results will add to the local understanding of efficacy of teen driver interventions at the population and individual driver level. Findings from this research will be used by policymakers and program administrations to refine programs for teen driver training and interventions. The knowledge may also be useful when shared with other rural states where teen drivers are a public safety concern.

Relevance to Strategic Goals

Safety: Improving public health and safety is a top priority for the USDOT.[2] Among states, progress is possible by understanding and addressing crash risk by identifying priorities based on risk and using high-quality data to optimize policy decisions and strategic countermeasure investment. Teen driver crashes are an emphasis area for the NDDOT – this pilot will provide valuable information for future policy and program investment aimed at preventing teen driver crashes.

Educational Benefits

Professional development in stakeholder education related to research findings.

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[1] https://www.cdc.gov/phlp/publications/type/gdl.html

[2] https://www.transportation.gov/sites/dot.gov/files/docs/Draft%20Strategic%20Plan%20OMB%20submission public_comment_508.pdf

Technology Transfer

Journal articles and presentations to academic and practitioner audiences will be used to disseminate research findings.

Work Plan

1) Contribute to the joint NDDOT/NDHP parent advisory letter in validating the 2010 risk identification model. (Underway, NDDOT funded)
2) Work with NDDOT to establish marker in driver file for parent advisory letter recipients based on teen driver crash and/or citation events and inventory file for parents/drivers receiving intervention. (Underway, NDDOT funded)
3) Develop parent survey to collect perception and action related to teen driver advisement letter. (Initiated with NDDOT funds)
     a) Finalize and mail teen drivers' parent survey.
     b) Enter and analyze parent survey response data.
     c) Per NDDOT request, conduct follow-up parent mail survey to assess refinement or the state agency advisement letter and resources in terms of parent actions and perceptions.
4) Collect teen driver crash and citation records.
5) Analyze of early GDL population licensure safety experience in terms of citations and crashes.
     a) Descriptive analysis of early GDL population (year one) considering most recent road test date for the GDL restricted license.
     b) Conduct survival analysis of early teen driver crash risk to update the understanding of risk markers related to the state parent advisory letter intervention strategy.
     c) Test a machine learning approach to the young GDL driver risk factor identification.
6) Complete analysis of parent letter pilot based on survey responses to assess parent perceptions and actions. crash and citation data.
     a) Present advisory letter descriptive statistics to characterize teen driver risk factors.
     b) Report findings with regard to parental engagement, training and monitoring for their teen driver in relation to the advisory letter strategy. (Complete)
     c) Provide recommendation summary to the NDDOT to consider in program management in their ongoing improvement process.
     d) Conduct second survey assessment and summarize for the state revision to the parent advisory letter that was initiated by the initial program survey.
7) Draft Journal Articles.
8) Finalize and Submit Journal Articles. (One finalized/submitted; additional journal articles)
9) Present Findings.

Project Cost

Total Project Costs:	$272,890
MPC Funds Requested:	$136,445
Matching Funds:	$136,445
Source of Matching Funds:	NDSU Uncollected Indirect Costs, $23,000
	NDSU General Funds (Salary Match), $51,100
	NDSU Returned Indirects, $42,345
	NDDOT In-Kind Contribution, $20,000

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