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Introduction

Road conditions and vehicle speeds are important factors that influence traveler safety during winter storms. Vaisala’s proprietary “Grip” measure provides an imputed measure of road surface friction. The Average Distribution Deviation (ADD) measures changes in the distribution of vehicle speeds during and after winter weather events, capturing the traveling public’s response to their perception of road surface conditions. The objective of this project was to gain a better understanding of the relationship among Grip, ADD and adverse safety outcomes.

Methodology

Using data collected by Road Weather Information System (RWIS) stations the research team identified periods when the ADD was within the normal range and Grip was compromised. This occurrences indicates that the traffic speed distribution is similar to that seen on clear days but that road conditions are degraded. Days when this occurred were categorized as high-risk days.

The relative frequency of adverse safety outcomes from the VTrans Public Crash Data Query Tool and Vermont State Police Incident Reports were compared between high-risk and non-high-risk days. While the dataset included over 8,000 adverse events in total, only 125 of the events took place in close proximity (1 mile) to a RWIS station.

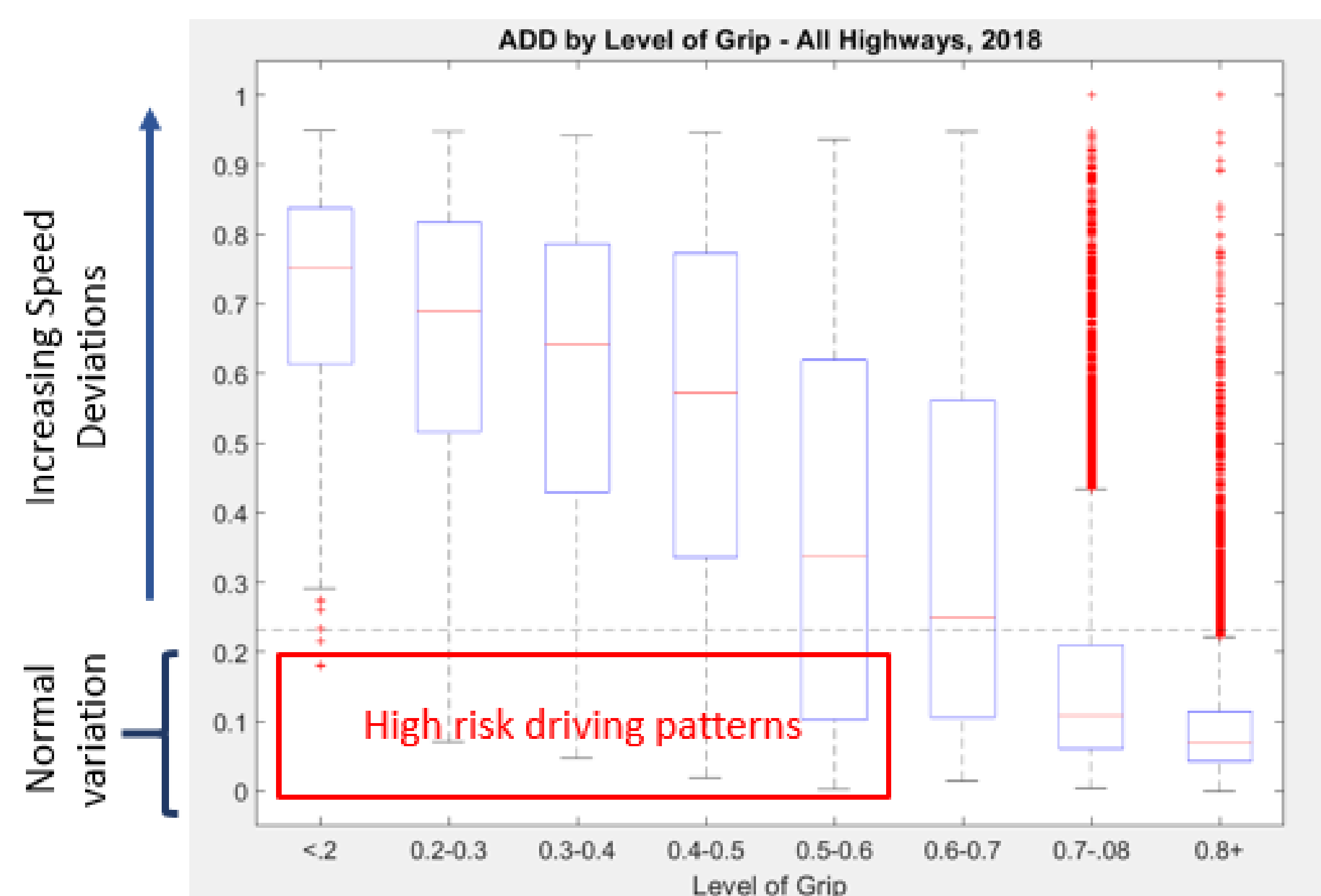


Figure 1. Indicators of high periods of high risk

Results

High-risk days identified in this research, showed a strong co-occurrence with crashes and other snow and ice-related incidents, increasing the frequency of one of these adverse outcomes substantially. However, this conclusion is based on a very limited set of data for the winters of 2016-2017 and 2017-2018, so more research is needed to support this conclusion as well as to determine whether a lower ADD threshold should be used to identify high-risk periods.

	2016-2017	2017-2018
Total Site-Days	1,440	3,020
Total High-Risk Site-Days	68	105
High-Risk Days with Adverse Outcome	22%	17%
Non-High-Risk Days with Adverse Outcome	4.0%	1.2%
Adverse outcomes near RWIS with Grip	70	55
Adverse outcomes on a High-risk day	15 (21%)	27 (49%)

Potential Impacts

If the ADD-Grip discrepancies can be used to predict crashes, then this finding could be extremely useful for winter traffic safety in Vermont. For example, a programmable message board, linked to the real-time calculation of the ADD-Grip discrepancy, could communicate poor Grip situations with greater urgency added when the ADD indicates that current speeds are not safe.

Acknowledgments

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Additional Information:

The final report for this project is available on the VTrans website:
<https://vtrans.vermont.gov/docs/completed>