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**National Highway  
Traffic Safety  
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# **Reducing Illegal Passing of Stopped School Buses: Demonstration Project**

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<b>16. Abstract</b> <p>The National Highway Traffic Safety Administration has been closely following the problem of vehicles illegally passing stopped school buses with stop signals deployed. There has been little research on media campaign effectiveness coupled with using automated cameras on school buses. This project examines a media campaign aimed at reducing illegal passing of school buses using automated cameras and evaluation of the processes and outcomes of that program. The study team helped implement media campaign programs in Allentown and Bethlehem, Pennsylvania, and conducted process and outcome evaluations to see if the approach was effective. The media campaign involved installing stop-arm camera systems on school buses and paid media messaging to inform both communities of their legal duty when encountering stopped school buses, the presence of the camera systems, and consequences for illegal passing. The media campaign went as planned, and survey results showed increases in awareness of the stop-arm camera prevention program. They showed that correct knowledge of what to do when encountering stopped school buses was low in some situations and did not increase after the media program. The stop-arm camera prevention component was not consistently implemented across sites or over time. While data provided by the camera operator showed many citations were issued in test communities during the study, precipitous drops in citation numbers at each site over time may have been related to legal issues with stop-arm camera enforcement, according to local news sources. Review of ticketable event data from the camera operator showed many events per bus per day during the baseline and the illegal passing stop-arm camera prevention program periods, but no reduction during the media campaign. Accuracy of ticketable event data could not be verified, however, as the camera operator only released composite data. Overall, results of this project are inconclusive. Evaluation identified several issues that need to be addressed to ensure future media campaigns can fully implement enforcement and measure effectiveness.</p>			
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# Executive Summary

## Background

Each State requires a driver to stop and remain stopped until a school bus extinguishes its stop indications—typically four red flashing lights and the deployment of a stop swing arm with embedded lights (Wright, Smith et al., in press). Despite these laws, drivers illegally pass stopped school buses frequently across the entire country with over 43.5 million illegal passes estimated to have occurred during the 2022-to-2023 school year (National Association of State Directors of Pupil Transportation Services, 2023).

Traditional traffic law enforcement requires a law enforcement officer to witness a violation, issue a citation, and defend that citation in court if challenged by the alleged violator. There are many more violations of school bus passing laws than can possibly be witnessed by law enforcement officers (NHTSA, n.d.). Many technologies have been developed to capture traffic violations including speeding, red light running, and illegal passing of school buses. These technologies attempt to increase enforcement and improve compliance through increased general deterrence. Given the paucity of past research on those technologies developed to reduce illegal passing of school buses, more information is needed effectiveness of media campaigns combined with automated camera system use to capture violations of school bus passing laws and issue citations in changing driver behavior.

## Objectives

The project objectives were to:

- Implement an illegal-passing stop-arm camera prevention program using automated stop-arm cameras to identify school bus passing law violators.
- Create and deploy a media campaign about the camera prevention program.
- Conduct comprehensive process and outcome evaluations of the media campaign and prevention program.

## Method

To address these objectives, the study team designed and implemented a media campaign in two adjacent communities, Allentown and Bethlehem, Pennsylvania. The media campaign involved installing stop-arm camera systems on all their school buses and substantial media messaging working with local law enforcement, informing local drivers

- of their legal duty when encountering stopped school buses,
- the presence of the camera systems, and
- the consequences for illegal passing.

A media agency provided key performance indicators (KPIs) for tracking to gauge exposure to the campaign. A community awareness/knowledge survey was used to determine if people in the intervention sites had read, seen, or heard about the media campaign and whether their knowledge or opinions of the school bus passing laws changed in response to the campaign. According to data provided by the camera enforcement operator, ticketable events were measured via stop-arm cameras that were used as part of the illegal-passing prevention program.

## Results

Process evaluation showed the media component was implemented as planned. The media KPIs and community survey results showed the two test cities were exposed to campaign messaging. At the end of the study, more people in the communities said they heard or saw any media about getting ticketed for illegally passing stopped school buses, and more people were aware cameras were permissible. The surveys also revealed most people in the test communities supported automated enforcement to address illegal passing and strict penalties for this offense. Before and after the campaign, about 75 percent of the respondents somewhat or strongly agreed with tickets being issued to the registered owner for illegal passing violations. Camera enforcement, stricter penalties, and more publicity of the laws were the top three reported approaches to address this problem both before and after the campaign. These findings bode well for the viability of a media campaign involving stop-arm camera systems on school buses to reduce illegal passing.

Importantly, a fairly large percentage of respondents did not know they needed to stop and stay stopped in the most common scenarios encountering a stopped school bus with stop indicators deployed with children loading or unloading. Table 1 shows that roughly 17 percent of people surveyed did not know they needed to stop and stay stopped on a two-lane road when approaching a school bus from behind and its stop indicators deployed. In addition, there were no increases in knowledge of correct behaviors after the media campaign, but this is not surprising as the campaign did not focus on what to do in various situations.

*Table 1. Scenario 1 (approaching stopped bus from rear on 2-lane road) Responses*

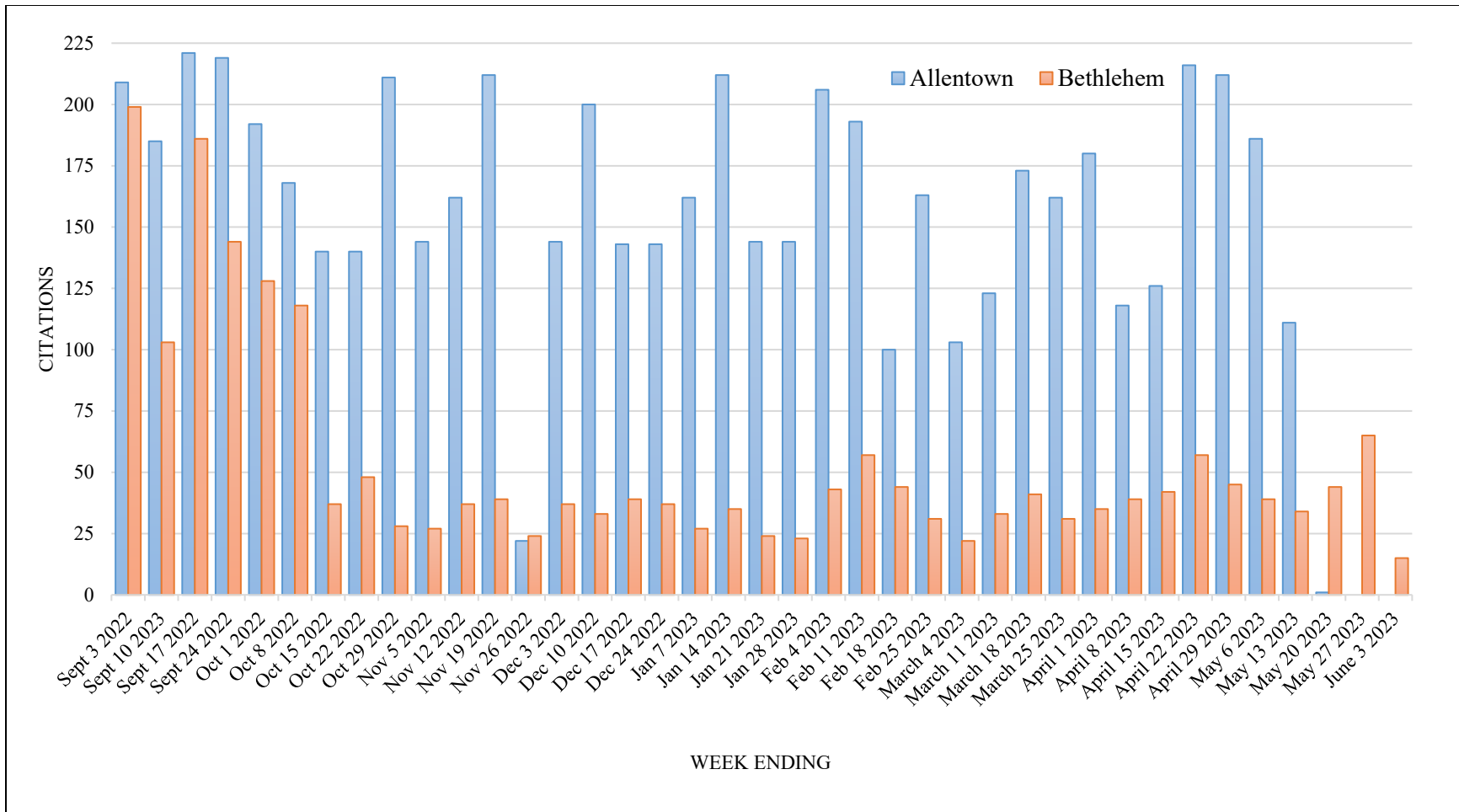
	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Nothing special	1.0	[0.4, 2.3]	1.0	[0.4, 1.9]
Proceed with caution	2.7	[1.5, 4.4]	3.1	[2.0, 4.5]
Slow down	6.2	[4.3, 8.6]	4.4	[3.1, 6.1]
Yield to children	3.7	[2.3, 5.7]	5.7	[4.2, 7.6]
Stop, look, and go	2.7	[1.5, 4.4]	3.5	[2.3, 5.0]
Stop and stay stopped	83.6	[80.1, 86.7]	82.4	[79.5, 85.0]

According to data provided by the camera enforcement operator, 5,890 citations were issued in Allentown and 2,090 in Bethlehem during the study, but there were precipitous drops in the number of citations issued over time at each site.

Figure 1 shows citation breakdown by week for the two sites.

A review of the ticketable events data provided by the camera enforcement operator showed many events per bus per day during both the baseline and prevention program periods. The number of ticketable events reported did not drop during the media campaign as one might hope if the program was affecting driver behaviors around stopped school buses. However, study staff were not given direct access to the raw camera data or footage to verify whether the events deemed ticketable were in fact violations; the camera operator provided composite data only.

Without more access to the video data for review by study staff, it is not possible to know whether there are any biases associated with the reported data such as high false positive rates (i.e., events were flagged as ticketable when no violation had occurred). This assumes the definitions of ticketable events did not change over time in the reported data, and the reported data are indeed accurate. These findings should be interpreted with caution given these limitations.



Notes: The media campaign ran from September 3, 2022, until June 3, 2023. December 25– December 31, 2022, not included (school out/holiday). June 2023 includes only June 1, 2023, – June 3, 2023.

Figure 1. Citations Issued by Week and Site



## Discussion

Evaluation results of effectiveness of the media campaign involving stop-arm camera systems on school buses were inconclusive. While the results demonstrated increased awareness of illegal-passing stop-arm camera prevention program activities, there was no observed increase in knowledge of correct behaviors around school buses. This may have resulted from the messaging having stronger focus about the presence of cameras on school buses and how illegally passing buses generally will lead to ticketing than on proper behaviors when encountering school buses under different roadway configurations. Considering driver knowledge of the law was low in certain scenarios, such as when a motorist approached a school bus from the front on a four-lane, undivided road and prior work has also shown knowledge gaps of situations when a stop is required at a national level (Wright., Blomberg, et al., in press), education programs are worth considering to reduce illegal passing of stopped school buses.

In addition, the project encountered difficulties like those in prior projects (e.g., Katz et al., 2021) where prevention program implementation was not consistent across sites and over time. Initially, large numbers of citations were being issued, which indicate the systems have potential to accurately document illegal passes. However, as the campaign progressed, reports cited that the judicial system became overwhelmed with appeal requests, so citations were dismissed by judges without any evidence (Mueller, 2023). Reports further cited that law enforcement agencies that needed to review and certify notices of violations were not consistently doing so because they did not want to certify violations that would eventually be dismissed (Mueller, 2023). According to PennDOT, the Pennsylvania stop-arm camera law was revised in October 2023 to address this issue by allowing PennDOT officers to hold hearings with vehicle owners who appealed citations, thus, reducing the administrative burden from magisterial district judges. Considering the challenges in relatively new programs such as those in Allentown and Bethlehem, it may be worthwhile to examine archival data in more established programs to determine program effectiveness, particularly if locations have data independent from the camera operator or the camera operator allows the study team to review video footage of events to verify the accuracy of the information. The revision of Pennsylvania's stop-arm camera law requires districts with programs to make violation data publicly available (PennDOT, 2024). In addition, standardizing definitions of ticketable events and how the artificial intelligence systems flag events may help reduce false positives. That is, standardizing definitions of ticketable events and how the artificial intelligence systems flag events may help reduce false positives (events flagged as violations when no violations occurred). It is not known how many false positive events were flagged by the system used in this study as the camera operator shared composite data only.

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## Background

The *Uniform Vehicle Code* (National Committee on Uniform Traffic Laws and Ordinances, 2000) and laws in all 50 States, the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands require a driver to stop and remain stopped until a school bus turns off its stop indications—typically four red flashing lights and the deployment of a stop swing arm with embedded lights (Wright, Bloomberg, et al., in press). One highway safety problem NHTSA has been following closely involves vehicles illegally passing stopped school buses with stop signals deployed. This dangerous driving behavior occurs frequently across the country, with over 43.5 million illegal passes estimated to have occurred during the 2022-2023 school year (NASDPTS, 2023).

Traditional traffic law enforcement requires a law enforcement officer to witness a violation, issue a citation, and defend that citation in court if challenged by the alleged violator. However, there are many more violations of school bus passing laws than can possibly be witnessed by law enforcement officers (NHTSA, n.d.). In response, some States permit bus drivers or other civilians to witness violations for enforcement action to be taken (Wright, Smith, et al., in press). More recently, several technologies have been developed to capture traffic violations including speeding, red light running, and illegal passing of school buses. These technologies aim to increase the overall enforcement level and improve compliance through increased general deterrence. According to the National Conference of State Legislatures (2024), at least 25 States currently have laws permitting use of cameras on the exterior of school buses to capture violations of school bus passing laws and allow the issuance of citations based on the evidence captured.

As part of a NHTSA study, Katz et al. (2021) reviewed existing programs and the literature to describe the state of practice on stop-arm camera enforcement in the United States. That review noted stop-arm cameras have been operating since 2011 with two primary approaches in use, license plate recognition and facial recognition. The Katz group said many States and jurisdictions required video clips of the illegal maneuvers and clear license plate images. That information was then shared with local law enforcement for review. The law enforcement agency would then either issue a warning or citation with penalties varying widely depending on jurisdiction. The study noted still images were generally clipped from videos and used for identification purposes. The Katz group noted some States required privacy safeguards for images of drivers and passengers. It was not clear from this report how many jurisdictions allowed issuance of citations to the registered vehicle owner versus the person who was driving the vehicle at the time of the violation. Issuing a ticket to the registered owner eliminates the need to identify who was driving and has been accepted by the courts in certain jurisdictions since it is reasonable to assume the registered owner has given consent to the violating driver to use the involved vehicle (*Kansas v. Glover*, 2019<sup>1</sup>).

Whether stop-arm camera enforcement programs are effective in reducing the illegal passing of stopped school buses has not been widely studied to date. A report on a program in Montgomery County, Maryland (Montgomery County Government, 2022) and a NHTSA demonstration project (Katz et al., 2021) provided information on the number of citations issued using camera systems. The Montgomery County program did not provide any measure of changes in motorist behavior, so it is unclear the extent to which this program may have reduced illegal passing. Katz

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<sup>1</sup> U.S. Supreme Court, No. 18–556. Argued November 4, 2019, decided April 6, 2020

et al. did measure motorist behavior with camera vendor data and bus driver-reported violations, but the programs were not implemented consistently across sites which made interpretation of the results difficult. Despite the program implementation issues, the Katz group's analysis of bus driver-reported violations showed decreases in violations at one of the sites after the camera policy announcement compared to before the announcement. Another site showed significant decreases in bus driver-reported violations after program implementation when comparing the pre-camera installation phase to the initial warning phases. Across all the camera vendor data analyzed in the study, only 1.87 percent of violators (out of 139,913 violations) were deemed to be repeat offenders. It is not clear, however, how many of these violations led to a citation and subsequent conviction. In addition, it is unknown what level of visibility of enforcement was achieved as the reports did not provide any information on media exposure or surveys of the target populations to determine if there was increased awareness of the enforcement.

Given the paucity of past research in this domain, more information is needed regarding whether a media campaign coupled with camera systems to capture violations of school bus passing laws and issue citations are effective for changing driver behavior. Using a media campaign as a means of prompting driver compliance with school bus passing laws has only been attempted on a very limited scale. For example, a program started in 1993 in New York State, Operation Safe Stop, focused on one-day enforcement efforts and accompanying press conferences, public service announcements, and publicity. This program was adopted by other States to use enforcement and education to remind the public to stop for school buses when loading and unloading (NHTSA, n.d.). The combination of enforcement using stop-arm camera systems on an entire fleet of school buses and substantially increased publicity about the camera enforcement program, however, has not been evaluated. The current project sought to fill this gap by implementing and evaluating a media campaign using stop-arm camera systems on school buses in two locales.

## **Objective**

The objectives of this project were to:

- Implement an illegal passing stop-arm camera prevention program aimed at identifying violators of school bus passing laws;
- Create and deploy substantial media campaign working with local law enforcement; and
- Conduct comprehensive process and outcome evaluations of the media campaign.

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## Method

### IRB and OMB Approval

Study protocols were reviewed by the National Opinion Research Center at the University of Chicago Institutional Review Board and the Office of Management and Budget (OMB Control Number 2127-0755), which approved data collection.

### Site Selection

The ability to address the objective depended on the selection of appropriate test sites and the implementation of a media campaigns by those sites. Site selection criteria:

- State and local laws that allowed the use of stop-arm camera enforcement
- City/county council and school boards approved the use of stop-arm camera enforcement
- Sufficient traffic density and documentation of stop-arm violations noted by the school district or citations issued by law enforcement
- Reasonably “representative” or “modal” for factors such as mix of road types, route lengths, ownership of bus operations, bus types, bus driver population, population demographics
- Support for the installation and maintenance of the camera system hardware and software
- No prior use of stop-arm camera enforcement in the area other than pilot testing
- No prior exposure to major media concerning stop-arm enforcement
- Commitment from the camera system operators to provide all camera-based citation data for the duration of the project

After reviewing dozens of potential locations, Bethlehem and Allentown were selected. Researchers visited both cities and held discussions with school district officials, local law enforcement, and the camera operator with plans to operate in the district. Both sites were already aware of and concerned about the illegal passing problem and expressed sincere interest in participating in the study.

### Media Campaign Approach

This project included a substantial media campaign effort that involved the use of automated cameras on school buses to capture video of potential violators of school bus passing laws in Allentown and Bethlehem. *Pennsylvania* § 3345 requires the motorist to stop when encountering a stopped school bus with its stop signals activated. This includes a motorist overtaking the stopped bus from behind or a motorist approaching the bus from the front, except on a divided roadway. In 2018 the Pennsylvania legislature passed a law allowing stop-arm cameras (NCSL, 2024). In that State the local board of school directors decides to implement camera enforcement for a “school entity” such as a school district. A camera must capture an image of the vehicle at the time of the alleged violation, including the license plate number with the State of issuance (Wright, Smith, et al., in press).

## ***Automated Camera Enforcement System***

The automated camera enforcement system included four components to capture and record violation information and relay the information to a database for later review.

1. A stop-arm camera box was mounted on the driver-side of the bus, in the center, behind the stop-arm. The camera was activated when the school bus stopped and the stop-arm deployed. It captured vehicle license plate information.
2. An artificial intelligence-powered 180° camera mounted on the driver-side roof of the bus above the stop-arm camera box.
3. A mobile digital video recording system onboard the bus recorded sensor and camera data.
4. An antenna relayed recorded video footage and sensor data to an in-house database through cellular data transfer.

A member of the camera operator's staff had to review each event flagged by the system to determine if an actual violation had occurred. Information on cases judged to be a violation of the school bus passing law was sent to the local police department. The local police department then had the discretion to issue a citation to the registered owner, which included a \$300 fine. The registered owner could contest a citation by submitting evidence they were not the driver, that the vehicle had been reported stolen, or that the vehicle was owned by someone else at the time of a violation. The owner was not required to provide the driver's identity as a condition of rebuttal.

## **Paid Media**

The media campaign objectives were to:

- Inform the public about school bus safety laws requiring motorists to stop while a bus is stopped to load/unload children;
- Deliver the illegal passing stop-arm camera prevention program message to the entire populations of the two cities, clearly showing the consequences for not stopping (i.e., ticket and fine amount); and
- Make the public fully aware that not stopping will result in a ticket as cameras were installed on all school buses in the two fleets.

The study team, local law enforcement, and the camera operator jointly created content consistent with these objectives. The participating school districts reviewed and approved the content before distributing it. The study team hired a professional media placement agency to distribute the content—cable television and digital media—in each city. This agency monitored the distribution of the media to ensure full exposure by the target population. Figure 2 and Figure 3 are examples of the campaign messaging. The digital campaign components were:

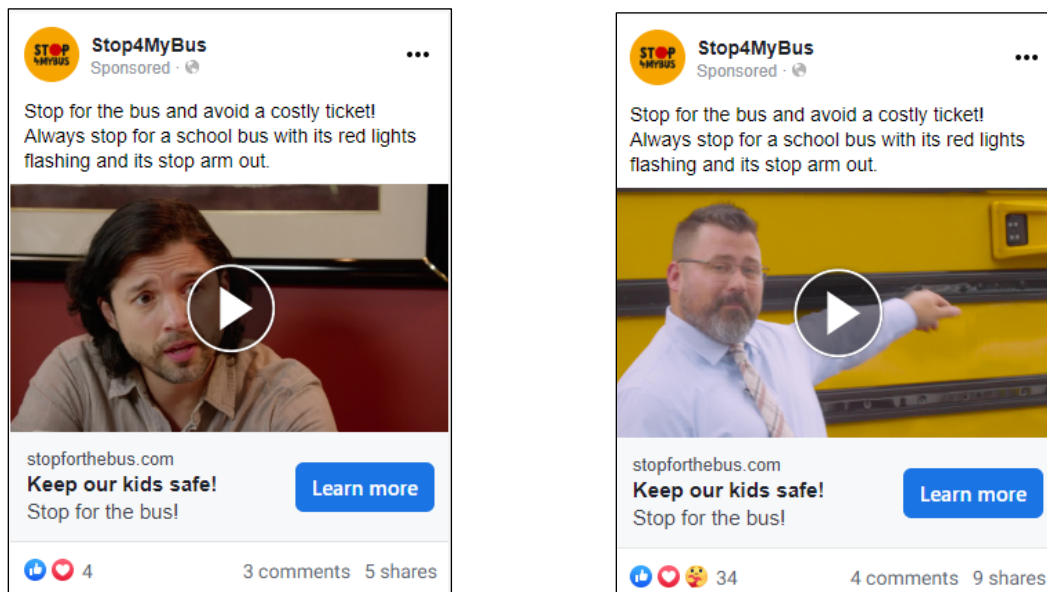
- Over-the-top (OTT): Connected TV and network;
- Pre-roll video (i.e., video content that automatically plays before a featured video on desktops, tablets, or mobile devices);



- Social media video;
- Digital out-of-home (i.e., content that is viewed outside the home including but not limited to billboards, gas station pumps, public transit, and doctor’s offices);
- YouTube videos; and
- Audio (digital audio sources including wfmz.com, Spotify Music, iHeartRadio Web, and Amazon Music Free).



*Figure 2. Campaign Billboard*



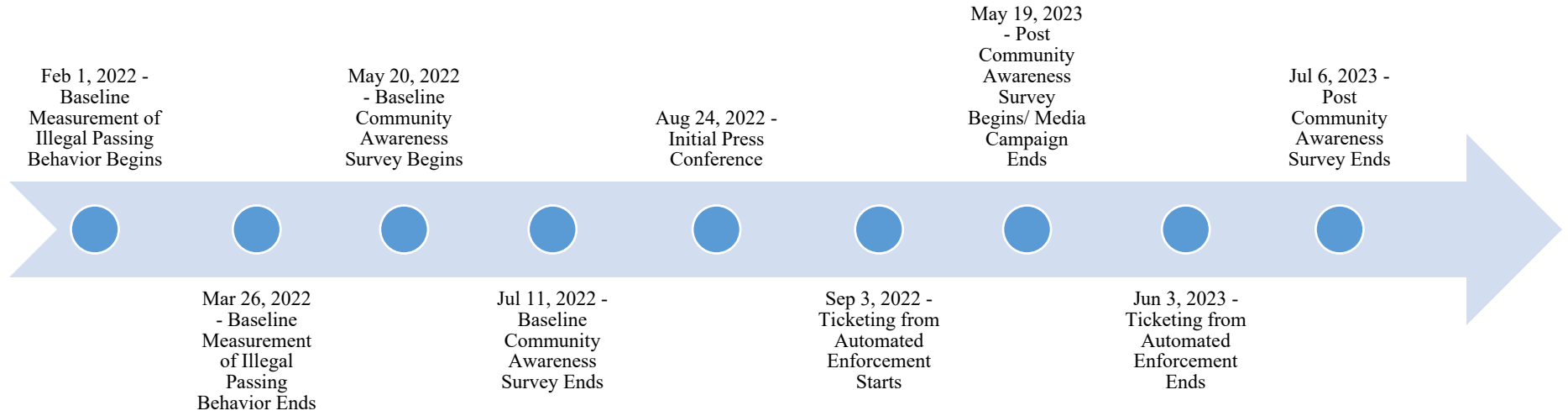
*Figure 3. Example Social Media Messages*

## Evaluation Design and Project Timeline

For this project, the study team obtained baseline measures of driver behaviors of interest (i.e., illegal passing of stopped school buses based on ticketable events captured by the automated camera systems) and public awareness and opinions on illegal passing topics before the program began. Data collection then continued throughout the media campaign period to determine if behaviors changed over time. A final awareness/opinions measure was taken after the paid media period ended.

Figure 4 presents the entire media campaign and evaluation timeline. The project gave technical help and limited financial support to help maintain schedules and to facilitate the evaluation. To create a meaningful time variable for analyses, researchers defined time periods. The baseline

period began when collection of the evaluation measure (i.e., motorist illegal passing behavior) started. This measurement of illegal passing behavior was collected as part of the camera manufacturer's pilot program that installed cameras on buses in each district to gauge the extent of the problem before automated illegal passing stop-arm camera prevention program began. This evaluation measure was taken during the 8 weeks from February 1 to March 26, 2022. A community awareness survey was given from May 20 to July 11, 2022, to assess levels of each community's awareness, opinions, and knowledge of school bus passing issues prior to the campaign. An initial press conference was held by both sites on August 24, 2022, kicking off the media campaign. Ticketing from the automated stop-arm cameras occurred for the entire school year (September 3, 2022, to June 3, 2023). Motorist illegal passing behavior was measured during this time. Each community's awareness of the campaign was assessed again from May 19 to July 6, 2023.



*Figure 4. Media Campaign and Evaluation Timeline*

### **Media Key Performance Indicators**

KPIs were tracked and provided by the professional media agency to gauge exposure to the campaign. These KPIs included impressions (i.e., the number of times that content was displayed) and clicks (i.e., the number of times a person interacted directly with campaign content).

### **Community Awareness/Knowledge Survey**

A community awareness/knowledge survey was used to determine if people at the intervention sites had read, seen, or heard about the media campaign and whether their knowledge or opinions of the school bus passing laws changed in response to the campaign. Two waves of survey data were collected in Allentown and Bethlehem. The baseline survey took place from May 20 to July 11, 2022, before any media or stop-arm camera prevention programming efforts had been undertaken. The second survey wave took place from May 19 to July 6, 2023, which was after the media campaign had ended. The illegal passing stop-arm camera prevention program continued to a certain extent during this period as the project did not have the authority to stop.

Prospective participants were contacted in person by project researchers trained in human subject protocols at selected shopping centers in Allentown and Bethlehem. Prospective respondents were approached and screened verbally to determine if they met the sampling requirements (i.e., 18 or older and a current driver). If they met the sampling requirements, the project researcher gave the person the opportunity to complete the survey on a study tablet or a link and unique code to use on their own device to access the survey. Upon completion of the survey, the respondent received a \$10 electronic gift card.

Table 2 shows the number of recruitment contacts for the community survey and the response rates in each site. As shown in Table 1 there were 1,204 people who responded across the two sites.

*Table 2. Community Survey Contacts and Survey Responses*

Site	Baseline	Baseline	Post	Post	TOTAL
	Contacts	Responses (%)	Contacts	Responses (%)	Responses (%)
Allentown	1,200	273 (22.8%)	1,314	423 (32.2%)	696 (27.7%)
Bethlehem	900	210 (23.3%)	1,500	298 (19.9%)	508 (21.2%)
<b>TOTAL</b>	<b>2,100</b>	<b>483 (23.0%)</b>	<b>2,814</b>	<b>721 (25.6%)</b>	<b>1,204 (24.5%)</b>

The 34-item survey (see Appendix A) was hosted online on the Voxco platform. This platform included page navigation and pause. The first two items asked respondents their age and if they currently drive. The survey ended if they were younger than 18 or did not currently drive. The remaining items covered driving behaviors, exposure to school buses on the road, knowledge of school bus passing laws, awareness of the media campaign, and opinions on school bus-related issues such as ticketing drivers. To assess driver knowledge of laws related to the passing of stopped school buses the seven scenarios described below were presented using 3-D animations. Each presentation began with an overhead view of the scenario and a description of the direction the vehicle participant was “driving.” The scenario then transitioned to a first-person view animated to look like the driver was approaching (from the front) or overtaking (from the rear) a school bus. To account for order effects, some participants completed the scenarios in order from 1 to 7 while others completed them in the reverse order. The order was randomly assigned.

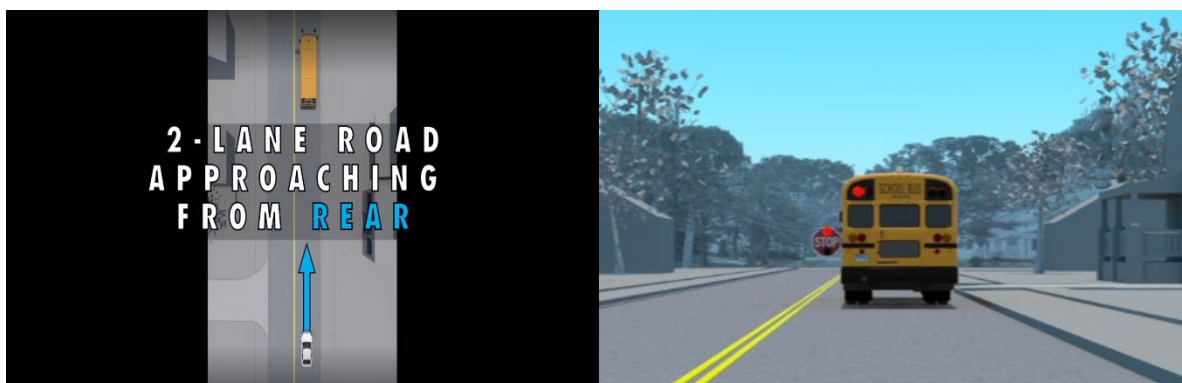
After the animated presentation was complete, each driver was asked the same question following all seven scenarios:

*What does the law say a driver must do in this situation?*

- Nothing special
- Proceed with caution
- Slow down
- Yield to children
- Stop, look, and go
- Stop and stay stopped

Some participants saw the response options as shown above (“Nothing special” to “Stop and stay stopped”) but others received them in the reverse order (“Stop and stay stopped” to “Nothing special”). Again, the response option order was randomly assigned.

Scenario 1 – A vehicle overtaking a school bus stopped on a two-lane, undivided roadway as its red lights and stop-arm deploy (Figure 5). The correct answer to this item in Pennsylvania was to “stop and stay stopped.”



*Figure 5. Scenario 1*

Scenario 2 – A vehicle approaching a school bus stopped on a two-lane, undivided roadway as its red lights and stop-arm deploy (Figure 6). The correct answer to this item in Pennsylvania was to “stop and stay stopped.”

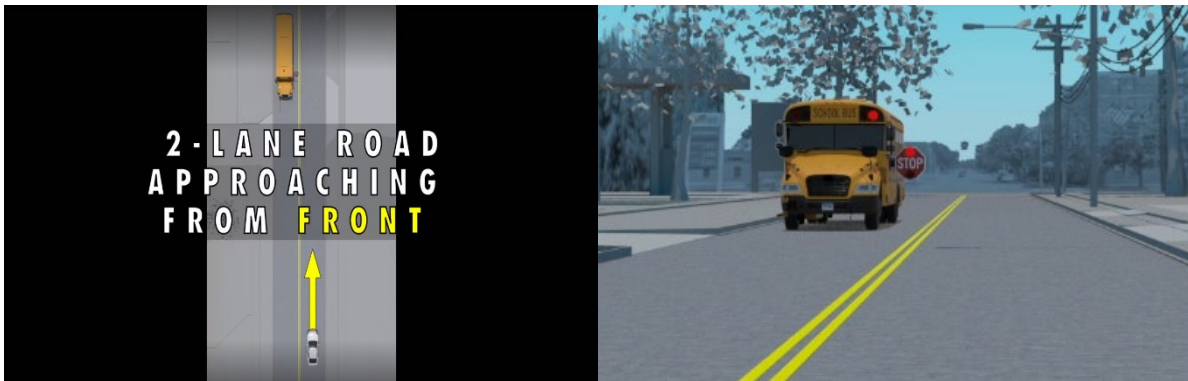


Figure 6. Scenario 2

Scenario 3 - A vehicle overtaking a school bus stopped on a four-lane, undivided roadway as its red lights and stop-arm deploy (Figure 7). The correct answer to this item in Pennsylvania was to “stop and stay stopped.”

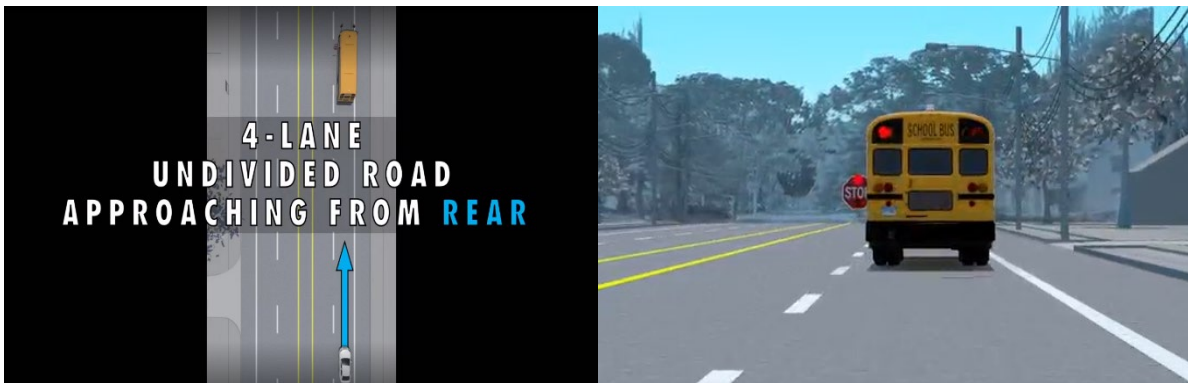


Figure 7. Scenario 3

Scenario 4 - A vehicle approaching a school bus stopped on a four-lane, undivided roadway as its red lights and stop-arm deploy (Figure 8). The correct answer to this item in Pennsylvania was to “stop and stay stopped.”



Figure 8. Scenario 4

Scenario 5 - A vehicle approaching a school bus stopped on a four-lane, divided (by a clearly visible physical median) roadway as its red lights and stop-arm deploy (Figure 9). The correct answer to this item in Pennsylvania was “nothing special” as the vehicle and traffic code indicates vehicles in opposing traffic on a separate roadway do not have to stop.



Figure 9. Scenario 5

Scenario 6 - A vehicle overtaking a school bus stopped as the last bus in a line of buses in a school driveway with its red lights flashing and stop-arm extended (Figure 10). The Pennsylvania traffic code is silent on driver requirements for approaching a bus on school property as the requirements for a motorist to stop in Pennsylvania are limited to buses on highways or trafficways.

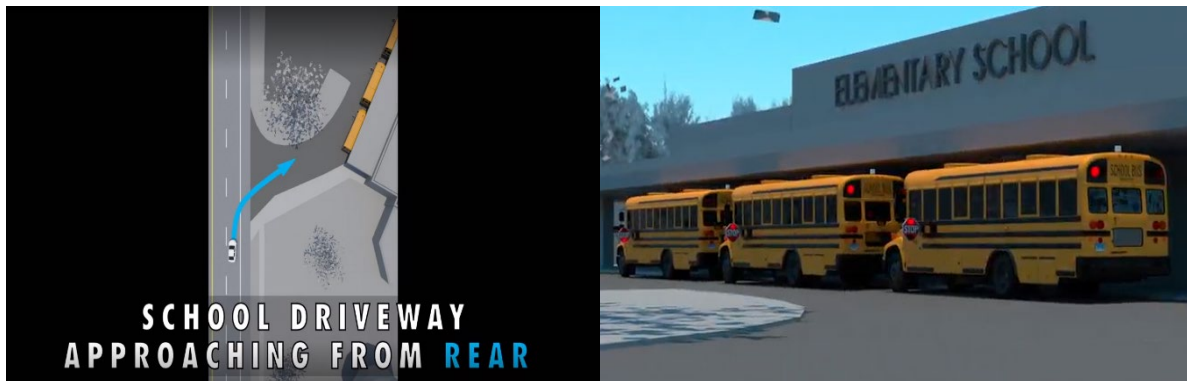


Figure 10. Scenario 6

Scenario 7 - Vehicle following a school bus on a four-lane, undivided roadway as its yellow lights start to flash (Figure 11). In Pennsylvania, the driver is required to proceed past the school bus with caution and be prepared to stop in this situation.



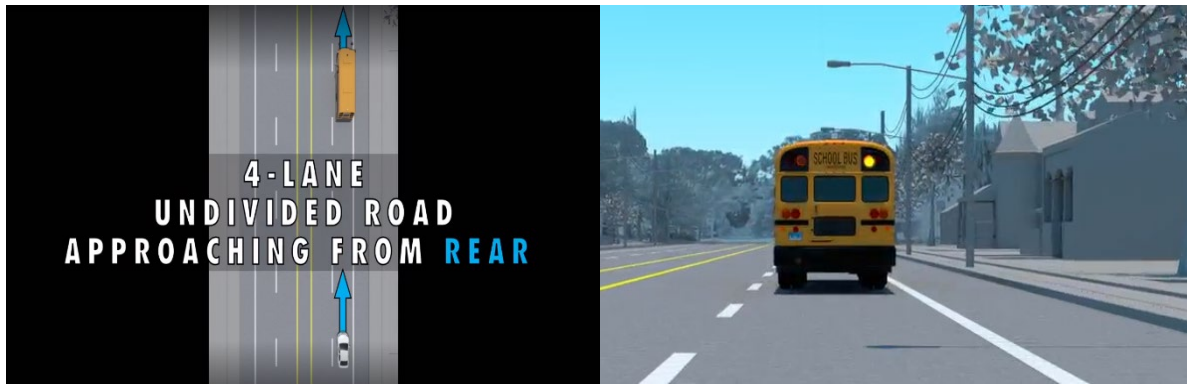


Figure 11. Scenario 7

### **Motorist Illegal Passing Behavior**

Ticketable events were measured via stop-arm cameras as part of the illegal passing stop-arm camera prevention program. To determine if an event was ticketable, video footage was flagged by the camera operator's artificial intelligence algorithm and reviewed by in-house staff to determine if the event was, in fact, an illegal pass. In this review, information that may affect whether an event was a violation, such as the roadway configuration (e.g., the presence of a physical median) or the bus driver behavior (e.g., bus driver oversight to activate warning or amber lights prior to stopping) was considered before forwarding the evidence package to the reviewing law enforcement agency. The camera operator gave the study an aggregate number of ticketable events across the study period that served as the primary behavioral measure to determine if illegal passing behaviors were indeed affected by the media campaign.

Having counts of citations issued was an important process measure to determine whether the prevention program activities were indeed substantial enough to affect driver behavior. The camera operator provided counts of citations issued by law enforcement at each site. These counts of citations served as a process measure rather than an outcome measure because of outside factors (e.g., changes in citation issuance policy by local law enforcement) that were reported to have affected whether a citation was issued as the project progressed.



## **Results**

### **Process Evaluation**

The process evaluation focused on determining whether the illegal passing stop-arm camera prevention program and media campaigns were implemented as planned.

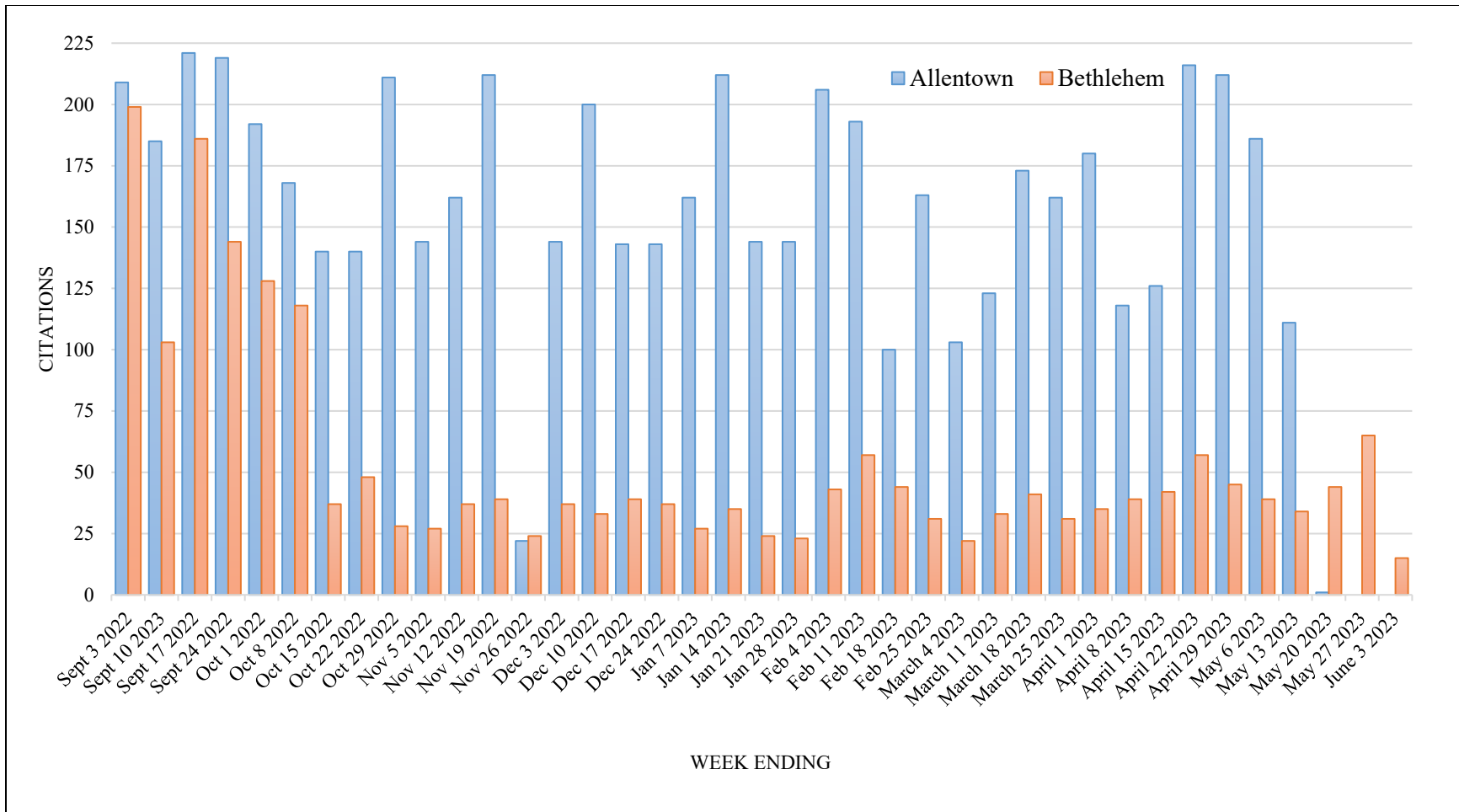
#### ***Buses Equipped With Camera Systems***

Based on data from the camera operator, the number of daily buses on the roadway with the camera systems installed varied over time at each site due to normal operational factors of pupil transportation systems (e.g., driver availability, bus breakdowns, holidays). In Allentown the number of operational school buses during a given week ranged from 59 to 90 (average of 80). In Bethlehem the number of operational school buses during a given week ranged from 70 to 92 (average of 82).

#### ***Citations Issued***

According to data from the camera enforcement operator, 5,890 citations were issued in Allentown and 2,090 in Bethlehem during the study period. Figure 12 shows the citation breakdown by week for the two sites. As seen in the figure, Bethlehem experienced a precipitous drop in citations issued starting in October 2022 and Allentown showed a complete stoppage of citation issuance in May 2023.

These drops may have been associated with processing of appeals. Local news coverage quoting both the camera system operator and the executive director for Pennsylvania's House Transportation Committee indicated the drops in citations were likely because "citations are a \$300 civil penalty while traffic tickets are criminal offenses, and the appeals and hearing process is backlogging caseloads of district court judges" (Mueller, 2023). The executive director for Pennsylvania's House Transportation Committee is quoted saying "The issue we were having primarily was with the magisterial district judges. There were issues where folks were trying to appeal tickets. But [magisterial district judges] weren't being responsive. They weren't scheduling the hearings, they were dismissing tickets without any evidence, or not on any grounds." As such, local law enforcement did not want to certify citations that would be easily dismissed (Mueller, 2023).



Notes: December 25 – December 31, 2023 not included (school out/holiday). June 2023 includes only June 1, 2023 – June 3, 2023.

Figure 12. Citations Issued by Week and Site

## Media Exposure

A total of \$158,000 in media buys was spread out over time between television and digital media channels as shown in Table 3.

*Table 3. Media Budget*

<b>Ad Channel</b>	<b>Run Dates</b>	<b>Investment</b>
Television	8/28/22 - 10/14/22	\$10,000
Digital		\$5,000
Television	10/15/22 - 10/31/22	\$3,000
Digital		\$13,000
Television	11/9/22 - 1/10/23	\$22,000
Digital		\$49,500
Television	4/1/23 - 5/19/23	\$6,000
Digital		\$49,500
<b>TOTAL</b>		<b>\$158,000</b>

Table 4 presents KPIs (impressions and clicks) for the media campaign by each component. The table shows that the campaign generated a total of 4,225,091 impressions and 4,738 clicks across all campaign components.

*Table 4. Media Campaign KPIs*

<b>Campaign Component</b>	<b>Impressions</b>	<b>Clicks</b>
OTT	662,810	104
Pre-roll	666,791	1,322
Social	772,110	2,829
Digital out of home	1,188,260	N/A
YouTube	598,937	441
Audio and Spotify	336,183	42
<b>TOTAL</b>	<b>4,225,091</b>	<b>4,738</b>

## Outcome Evaluation

### Community Awareness/Knowledge Survey

**Participants.** A total of 1,204 people responded to the community survey. Appendix B contains a table with the demographic characteristics of the Allentown and Bethlehem community awareness/knowledge survey samples before and after the campaign. The table shows the demographic sample characteristics were largely consistent pre/post the campaign. Overall, 64 percent of the entire sample was female. Regarding race, 72 percent of the entire sample was White. The tables that follow list survey responses for the baseline period compared to the period immediately after the media stopped for both sites combined. Results for each site separately can be found in Appendix B.

**Campaign Awareness.** Respondents were asked if they had seen or heard any media within the last 6 months about getting a ticket for illegally passing a stopped school bus. For both sites combined, the percentages of respondents who reported seeing or hearing anything before and after the campaign are shown below in Table 5. The overall change in distribution of responses from pre- to post-campaign was significant,  $\chi^2 (2, N = 1,204) = 8.569, p = .014$ . As shown below, the percentage of people who said they heard or saw any media about getting a ticket for illegally passing a stopped school bus increased from 13.7 percent before the campaign to 20.0 percent after.

*Table 5. School Bus Enforcement Pre/Post Campaign Awareness*

	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Yes	13.7	[10.8, 16.9]	20.0*	[17.2, 23.0]
No	64.8	[60.5, 69.0]	61.7	[58.1, 65.2]
Unsure	21.5	[18.0, 25.4]	18.3	[15.6, 21.3]

\*Statistically significant difference from pre to post,  $p < .05$ .

Respondents were asked if school bus enforcement cameras were permitted where they live. The overall change in distribution of responses from pre- to post-campaign was significant,  $\chi^2 (2, N = 1,204) = 13.540, p < .001$ . As shown in Table 6, the percentage of respondents who reported cameras were permissible increased from before (42.2%) to after (50.8%) the media campaign.

*Table 6. School Bus Camera Permissibility of School Bus Enforcement Cameras*

	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Yes	42.2	[37.9, 46.7]	50.8*	[47.1, 54.4]
No	5.0	[3.3, 7.2]	7.1	[5.4, 9.1]
Unsure	52.8*	[48.3, 57.2]	42.2	[38.6, 45.8]

\*Statistically significant difference from pre to post,  $p < .05$ .

Respondents were asked to indicate the penalty for first-time offenders who illegally pass a stopped school bus. A significant difference in response distributions was found pre/post the campaign,  $\chi^2 = (8, N = 1,204) = 15.871, p = .044$ . As shown in Table 7, the percentage of people who incorrectly reported the penalty was less than \$100 significantly increased from before to after the campaign. The percentage who reported the correct answer (i.e., \$250-\$459) also increased slightly from before (9.5%) to after (11.4%) the campaign, but the increase was not statistically significant.

Table 7. Penalty for Illegal Passing

	Pre (n= 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Nothing	1.2	[0.5, 2.5]	1.4	[0.7, 2.4]
Less than \$100	3.3	[2.0, 5.2]	7.2*	[5.5, 9.3]
\$100 - \$249	7.2	[5.2, 9.8]	8.9	[7.0, 11.1]
\$250 - \$459	9.5	[7.1, 12.4]	11.4	[9.2, 13.8]
\$500 or more	4.6	[3.0, 6.7]	4.0	[2.8, 5.6]
License suspension	4.1	[2.6, 6.2]	4.0	[2.8, 5.6]
Lose your license forever	0.2	[0.0, 1.0]	0.8	[0.3, 1.7]
Jail time	0.0	n/a	0.3	[0.1, 0.9]
Unsure	69.8*	[65.6, 73.7]	62.0	[58.4, 65.5]

\*Statistically significant difference from pre to post,  $p < .05$ .

**Knowledge of School Bus Passing Laws.** Respondents were asked what the law required a driver to do in each of the seven scenarios involving a driver encountering a school bus. Six of these scenarios involved the driver encountering a stopped school bus with its stop-arm deployed and red lights flashing. Response distributions for each scenario pre- and post-media campaign are presented below.

*Scenario 1 – Two-Lane Undivided Road, Approaching From the Rear.* Table 8 shows the responses for Scenario 1 involving a motorist approaching a stopped school bus from the rear on a two-lane, undivided road. No significant difference in response distributions was found pre/post the campaign,  $\chi^2 (5, N = 1,204) = 4.780, p = .443$ . In both time periods, over 80 percent of respondents indicated the correct behavior (“stop and stay stopped”).

Table 8. Scenario 1 Responses

	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Nothing special	1.0	[0.4, 2.3]	1.0	[0.4, 1.9]
Proceed with caution	2.7	[1.5, 4.4]	3.1	[2.0, 4.5]
Slow down	6.2	[4.3, 8.6]	4.4	[3.1, 6.1]
Yield to children	3.7	[2.3, 5.7]	5.7	[4.2, 7.6]
Stop, look, and go	2.7	[1.5, 4.4]	3.5	[2.3, 5.0]
Stop and stay stopped	83.6	[80.1, 86.7]	82.4	[79.5, 85.0]

Scenario 2- Two-Lane, Undivided Road, Approaching From the Front. Table 9 shows the responses for Scenario 2 involving a motorist approaching a stopped school bus from the front on a two-lane undivided road. No significant difference in response distributions was found pre/post the campaign,  $\chi^2 (5, N = 1,204) = 5.658, p = .341$ . In both time periods, over 80 percent of respondents indicated the correct behavior (i.e., “stop and stay stopped”).

Table 9. Scenario 2 Responses

	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Nothing special	1.9	[0.9, 3.4]	1.0	[0.4, 1.9]
Proceed with caution	3.3	[2.0, 5.2]	2.8	[1.8, 4.2]
Slow down	4.6	[3.0, 6.7]	3.6	[2.4, 5.2]
Yield to children	5.6	[3.8, 7.9]	4.4	[3.1, 6.1]
Stop, look, and go	2.9	[1.7, 4.7]	4.6	[3.2, 6.3]
Stop and stay stopped	81.8	[78.2, 85.0]	83.6	[80.8, 86.2]

Scenario 3 – Four-Lane Undivided Road, Approaching From the Rear. Table 10 shows the responses for Scenario 3 involving a motorist approaching a stopped school bus from the rear on a four-lane, undivided road. No significant difference in response distributions was found pre/post the campaign,  $\chi^2 (5, N = 1,204) = .610, p = .988$ . In both time periods, over 80 percent of respondents indicated the correct behavior (“stop and stay stopped”).

Table 10. Scenario 3 Responses

	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Nothing special	0.4	[0.1, 1.3]	0.6	[0.2, 1.3]
Proceed with caution	3.9	[2.5, 6.0]	3.5	[2.3, 5.0]
Slow down	4.3	[2.8, 6.4]	4.7	[3.3, 6.4]
Yield to children	5.0	[3.3, 7.2]	4.9	[3.5, 6.6]
Stop, look, and go	4.1	[2.6, 6.2]	3.6	[2.4, 5.2]
Stop and stay stopped	82.2	[78.6, 85.4]	82.8	[79.9, 85.4]

Scenario 4 – Four-Lane Undivided Road, Approaching From the Front. Table 11 shows the responses for Scenario 4 involving a motorist approaching a stopped school bus from the front on a four-lane undivided road. No significant difference in response distributions was found pre/post the campaign,  $\chi^2(5, N = 1,204) = 5.121, p = .401$ . In both time periods, over 60 percent of respondents indicated the correct behavior (“stop and stay stopped”).

Table 11. Scenario 4 Responses

	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Nothing special	4.1	[2.6, 6.2]	2.6	[1.6, 4.0]
Proceed with caution	12.6	[9.9, 15.8]	13.7	[11.4, 16.4]
Slow down	6.8	[4.8, 9.3]	6.7	[5.0, 8.7]
Yield to children	8.5	[6.2, 11.2]	6.5	[4.9, 8.5]
Stop, look, and go	7.5	[5.4, 10.1]	6.2	[4.6, 8.2]
Stop and stay stopped	60.5	[56.0, 64.7]	64.2	[60.47, 67.7]

Scenario 5 – Four-Lane Divided Road, Approaching From the Front. Table 12 shows the responses for Scenario 5 involving a motorist approaching a stopped school bus from the front on a four-lane divided road. No significant difference in response distributions was found pre/post the campaign,  $\chi^2(5, N = 1,204) = 3.393, p = .640$ . In both time periods, “stop and stay stopped” and “proceed with caution” were the most frequent responses.

Table 12. Scenario 5 Responses

	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Nothing special	13.9	[11.0, 17.2]	11.2	[9.1, 13.7]
Proceed with caution	32.5	[28.4, 36.8]	31.6	[28.3, 35.1]
Slow down	9.5	[7.1, 12.4]	8.6	[6.7, 10.8]
Yield to children	9.1	[6.8, 11.9]	9.3	[7.3, 11.6]
Stop, look, and go	6.2	[4.3, 8.6]	6.9	[5.3, 9.0]
Stop and stay stopped	28.8	[24.9, 32.9]	32.3	[29.0, 35.8]

Scenario 6 - School Driveway, Approaching From the Rear. Table 13 shows the responses for Scenario 6 involving a motorist approaching a school bus stopped as the last bus in a line of buses in a school driveway from the rear. No significant difference in overall response distributions was found by the chi-square test pre/post the campaign,  $\chi^2(5, N = 1,204) = 9.995, p = .075$ , but two differences were found via z-tests.

Table 13. Scenario 6 Responses

	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Nothing special	1.9*	[0.9, 3.4]	0.6	[0.2, 1.3]
Proceed with caution	17.4	[14.2, 21.0]	15.8	[13.3, 18.6]
Slow down	3.1	[1.8, 4.9]	5.7*	[4.2, 7.6]
Yield to children	16.1	[13.1, 19.6]	14.7	[12.3, 17.4]
Stop, look, and go	11.2	[8.6, 14.2]	10.5	[8.5, 12.9]
Stop and stay stopped	50.3	[45.9, 54.8]	52.7	[49.1, 56.3]

\*Statistically significant difference from pre to post,  $p < .05$ .

Scenario 7 - Yellow Lights Flashing. Table 14 shows the responses for Scenario 7 involving a motorist approaching a school bus with its yellow lights flashing. No significant difference in responses was found pre/post the campaign,  $\chi^2(5, N = 1,204) = .940, p = .967$ . The most common answer provided was “stop and stay stopped” with “slow down” and “proceed with caution” the next most common. Because determining what the correct answer for Scenario 7 was not possible, 13 reflects the percentages of each response chosen.



Table 14. Scenario 7 Responses

	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Nothing special	2.1	[1.1, 3.6]	2.6	[1.6, 4.0]
Proceed with caution	18.4	[15.2, 22.1]	17.9	[15.2, 20.8]
Slow down	22.4	[18.8, 26.2]	22.1	[19.1, 25.2]
Yield to children	6.0	[4.1, 8.4]	6.4	[4.8, 8.3]
Stop, look, and go	4.3	[2.8, 6.4]	3.6	[2.4, 5.2]
Stop and stay stopped	46.8	[42.4, 51.2]	47.4	[43.8, 51.1]

**Opinions on Enforcement.** Respondents were asked their opinion on the best way to prevent drivers from illegally passing stopped school buses. The percentages of respondents who reported each prevention approach before and after the campaign are shown below in Table 15. No significant difference was found,  $\chi^2(9, N = 1,204) = 4.978, p = .836$  in overall response patterns over time. Camera enforcement, stricter penalties, and more publicity of the laws were the top three reported approaches both before and after the campaign.

Table 15. Opinion on Illegal Passing Prevention Approaches

	Pre (n = 483)		Post (n = 721)		Total (N=1,204)	
	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)
Police patrols near the school bus	10.1	[7.7, 13.1]	9.3	[7.3, 11.6]	9.6	[8.1, 11.4]
Police riding on the school bus	2.1	[1.1, 3.6]	3.6	[2.4, 5.2]	3.0	[2.1, 4.1]
Camera enforcement	29.4	[25.5, 33.6]	27.0	[23.9, 30.4]	28.0	[25.5, 30.6]
Stricter penalties	20.9	[17.5, 24.7]	22.6	[19.7, 25.8]	21.9	[19.7, 24.3]
More publicity of the laws	17.0	[13.8, 20.5]	17.6	[15.0, 20.5]	17.4	[15.3, 19.6]
Larger stop-arm	6.8	[4.8, 9.3]	7.1	[5.4, 9.1]	7.0	[5.6, 8.5]
More or brighter lights on the school bus	2.7	[1.5, 4.4]	1.9	[1.1, 3.2]	2.2	[1.5, 3.2]
Better driver education	9.3	[7.0, 12.2]	9.2	[7.2, 11.4]	9.2	[7.7, 11.0]
Other	1.7	[0.8, 3.1]	1.5	[0.8, 2.6]	1.6	[1.0, 2.4]
(Skipped item)	0.0	n/a	0.1	[0.0, 0.6]	0.1	[0.0, 0.4]

Respondents were also asked if they agreed specifically with the approach of the registered owner of a violating vehicle (i.e., not necessarily the driver) receiving a ticket based on an illegal passing violation. Table 16 shows the percentage of respondents who agreed with this approach before and after the campaign. In both measurement periods, about 75 percent of the respondents somewhat or strongly agreed with tickets being issued to the registered owner. A significant difference was found in overall response distributions,  $\chi^2(4, N = 1,204) = 10.660, p = .031$ . As shown in Table 16, the percentage of people who somewhat disagreed with the approach of the registered owner of a violating vehicle receiving a ticket decreased from 10.6 percent before the campaign to 6.5 percent after it, but there were no notable increases in the percentages of people somewhat or strongly agreeing.

Table 16. Agreement With Tickets to Registered Owner

	Pre (n = 483)		Post (n = 721)	
	%	95% CI (%)	%	95% CI (%)
Strongly agree	51.6	[47.1, 56.0]	54.1	[50.4, 57.7]
Somewhat agree	22.4	[18.8, 26.2]	21.6	[18.7, 24.8]
Neither agree nor disagree	9.5	[7.1, 12.4]	13.2	[10.9, 15.8]
Somewhat disagree	10.6*	[8.1, 13.5]	6.5	[4.9, 8.5]
Strongly disagree	6.0	[4.1, 8.4]	4.6	[3.2, 6.3]

\*Statistically significant difference from pre to post,  $p < .05$ .

Respondents were asked to select what the most appropriate penalty (i.e., could only pick one response) should be for drivers who illegally pass a stopped school bus. Table 17 shows the percentage of respondents who reported each penalty before and after the campaign. No significant difference in overall response patterns was found,  $\chi^2(7, N = 1,204) = 4.874, p = .675$ . The most prevalent responses before and after the campaign were a fine and points on the license followed by a fine but no points on their license.

Table 17. Opinion on Penalty for Illegal Passing

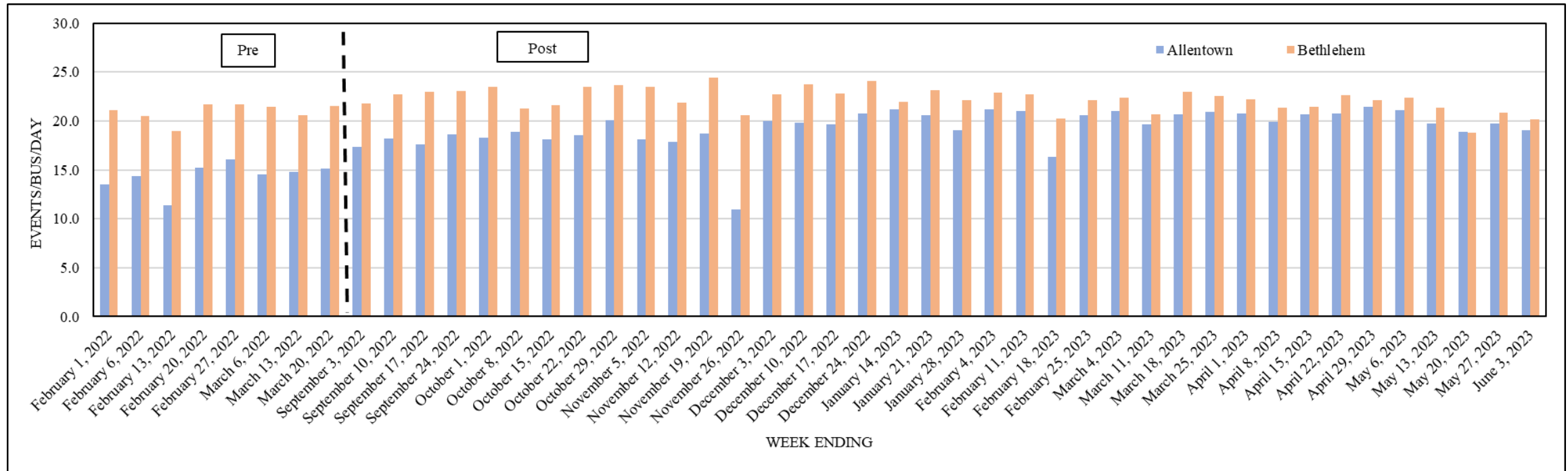
	Pre (n = 483)		Post (n = 721)		Total (N = 1,204)	
	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)
No penalty	1.0	[0.4, 2.3]	1.4	[0.7, 2.4]	1.2	[0.7, 2.0]
A warning	12.4	[9.7, 15.6]	9.8	[7.8, 12.2]	10.9	[9.2, 12.7]
A fine but no points on their license	28.4	[24.5, 32.5]	27.3	[24.2, 30.7]	27.7	[25.3, 30.3]
A fine <i>and</i> points on their license	41.8	[37.5, 46.3]	45.4	[41.7, 49.0]	43.9	[41.2, 46.8]
License suspension	11.0	[8.4, 14.0]	11.2	[9.1, 13.7]	11.1	[9.4, 13.0]

	Pre (n = 483)		Post (n = 721)		Total (N = 1,204)	
	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)
Lose their license forever	2.3	[1.2, 3.9]	1.7	[0.9, 2.8]	1.9	[1.2, 2.8]
Jail time	1.0	[0.4, 2.3]	1.7	[0.9, 2.8]	1.4	[0.9, 2.2]
Other	2.1	[1.1, 3.6]	1.5	[0.8, 2.6]	1.7	[1.1, 2.6]

***Ticketable Events Before and During the Campaign***

Figure 13 presents a summary of what were deemed to be ticketable illegal passing events per bus per day in each site according to data from the camera operator. According to this data, there were about 19 to 22 ticketable events per bus per day during the 8-week baseline period before the media campaign in Bethlehem and 19 to 24 events per bus per day during the media campaign. In Allentown, there were about 11 to 16 events per bus per day during the baseline period and about 11 to 22 events per bus per day during the campaign. Based on these sets of data, no meaningful reductions in ticketable events were observed during the study period.

Figure 13. Ticketable Events per Bus per Day in Each Site as Reported by Camera Operator



Notes: December 25 – December 31, 2023 not included (school out/holiday). June 2023 includes only June 1, 2023 – June 3, 2023.

## Discussion

This project involved assisting with the implementation of a media campaign in Allentown and Bethlehem and conducting process and outcome evaluations of the programs. The media campaign involved installing stop-arm camera systems on all school buses in each district and paid media messaging to inform the communities of their legal duty when encountering stopped school buses, the presence of the camera systems, and the consequences of illegal passing. The process evaluation showed the media component of the media campaign was implemented as planned. The media KPIs and the community survey results showed the two test communities were exposed to the campaign messaging as more people heard or saw any media about getting a ticket for illegally passing a stopped school bus, and they were more aware cameras were permissible after the media campaign ended.

The illegal passing stop-arm camera prevention program component of the campaign, however, was not consistently implemented across sites or over time. Citation data from the camera operator enforcement showed that many citations were issued in the test communities during the study period, but there were precipitous drops in the number of citations issued at each site that may have been related to legal issues reported by Allentown and Bethlehem local media. Specifically, it was reported that law enforcement agencies that needed to review and certify notices of violations were not consistently doing so, particularly as the campaign progressed because citations were getting dismissed without any evidence as the judicial system became overloaded with appeals that were not being processed (Mueller, 2023). The Pennsylvania stop-arm camera law was revised in October 2023 to address this issue by allowing PennDOT officers to hold hearings with vehicle owners who appealed citation, thus, removing the resource constraints on magisterial district judges (PennDOT, 2024).

Measures of illegal passing behavior from the camera operator showed many ticketable events per bus per day before, during, and after the campaign. Assuming the definitions of ticketable events did not change over time in the reported data, it does not appear as if there was a reduction in illegal passing behaviors at the study sites.

One issue the study team ran into was lack of direct involvement from law enforcement and commitment from the courts to uphold the citations. Our recommendation for future efforts includes initial involvement from law enforcement on the violation/citation review process from the start. Another issue was the camera enforcement operator was only willing to share composite data. In future studies, access to raw data from the camera operator should be included in site selection criteria.

Overall, the results of this study are inconclusive about the effectiveness of a media campaign involving stop-arm camera systems on school buses. Considering the challenges in relatively new programs such as the ones in Allentown and Bethlehem, it may be worthwhile to examine archival data in pre-established programs to determine program effectiveness, particularly if the site or sites have data independent from the camera operator or if the camera operator allows the study team to review video footage of events. The revision of Pennsylvania's stop-arm camera law discussed previously requires districts with programs to make such data public (PennDOT, 2024).

Importantly, a fairly large percentage of respondents did not know they needed to stop and stay stopped in the most common scenarios in which they would encounter a stopped school bus with children loading or unloading and its stop indicators deployed. Roughly 17 or 18 percent of

people surveyed did not know they needed to stop and stay stopped on a two-lane road when approaching a school bus from behind or the front when its stop indicators were deployed. Little change in knowledge of the motorist requirements when encountering a school bus was observed before and after the campaign. This may have been a result of the messaging having a stronger focus about the presence of cameras on school buses and how illegally passing a bus generally will lead to a ticket than on the specific scenarios stops were and were not required. Considering driver knowledge of the law was low in certain scenarios such as when a motorist approached a school bus from the front on a four-lane, undivided road, education programs might be worthwhile to consider reducing illegal passing of stopped school buses.

The outcome evaluation also revealed many people in the test communities are consistently in support of automated enforcement to address illegal passing and strict penalties for this offense generally. Before and after the campaign, about 75 percent of the respondents somewhat or strongly agreed with tickets being issued to the registered owner for illegal passing violations. Camera enforcement, stricter penalties, and more publicity of the laws were the top three reported approaches to address this problem both before and after the campaign. These findings bode well for the possible viability of a future of a media campaign approach involving stop-arm camera systems on school buses to reduce driver illegal passing.

On October 23, 2023, after this study had been completed, Pennsylvania's stop-arm camera law was revised to allow motor vehicle owners to request a hearing with a PennDOT officer for purposes of contesting a violation, removing the administrative burden from magisterial district judges. The updated law also required transparent information from automated camera enforcement efforts, such as the number of school buses equipped with these systems, number of violations issued, and the amount of fines issued and collected (PennDOT, 2024).



- National Conference of State Legislatures. (2024, March). *State school bus stop-arm camera laws*. [www.ncsl.org/transportation/state-school-bus-stop-arm-camera-laws#:~:text=At%20least%2025%20states%20have,in%202020%20and%202021%20respectively](http://www.ncsl.org/transportation/state-school-bus-stop-arm-camera-laws#:~:text=At%20least%2025%20states%20have,in%202020%20and%202021%20respectively).
- National Center for Statistics and Analysis. (2021, February). *Seat belt use in 2020 – Overall results* (Traffic Safety Facts Research Note. Report No. DOT HS 813 072). National Highway Traffic Safety Administration. <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813072>
- National Highway Traffic Safety Administration . (n.d.) *Reducing the illegal passing of school buses: Best practices guide*. [Web page]. [www.nhtsa.gov/school-bus-safety/reducing-illegal-passing-school-buses](http://www.nhtsa.gov/school-bus-safety/reducing-illegal-passing-school-buses)
- PennDOT. (2024). *PennDOT announces update to for automated school bus enforcement*. [www.dmv.pa.gov/Driver-Services/School-Bus-Drivers/SiteAssets/Pages/School%20Bus%20Safety/03.8.24%20-%20PennDOT%20School%20Bus%20Cameras.pdf](http://www.dmv.pa.gov/Driver-Services/School-Bus-Drivers/SiteAssets/Pages/School%20Bus%20Safety/03.8.24%20-%20PennDOT%20School%20Bus%20Cameras.pdf)
- Thomas, F. D., Blomberg, R. D., Peck, R. C., Cosgrove, L. A., & Salzberg, P. M. (2008). Applying high-visibility enforcement to passenger vehicles interacting with commercial vehicles. *Journal of Safety Research*, 29, 459-468.
- Tison, J., & Williams, A. F. (2010). *Analyzing the first years of the Click It or Ticket mobilizations* (Report No. DOT HS 811 232). National Highway Traffic Safety Administration. [www.ems.gov/pdf/811232.pdf](http://www.ems.gov/pdf/811232.pdf)
- Van Houten, R., Malenfant, L., Blomberg, R. D., Huitema, B. E., & Casella, S. (2013, July). *High-visibility enforcement on driver compliance with pedestrian right-of-way laws* (Report No. DOT HS 811 786). National Highway Traffic Safety Administration. [www.nhtsa.gov/sites/nhtsa.gov/files/811786.pdf%2045](http://www.nhtsa.gov/sites/nhtsa.gov/files/811786.pdf%2045)
- Van Houten, R., Malenfant, L., Blomberg, R. D., & Huitema, B. E. (2017, January). *The effect of high-visibility enforcement on driver compliance with pedestrian right-of-way laws: 4-year follow-up* (Report No. DOT HS 812 364). National Highway Traffic Safety Administration. [www.nhtsa.gov/sites/nhtsa.gov/files/documents/812364\\_highvisibilityenfdrivercompeds4yearfollowup.pdf](http://www.nhtsa.gov/sites/nhtsa.gov/files/documents/812364_highvisibilityenfdrivercompeds4yearfollowup.pdf)
- Wright, T. J., Smith, S. A., Thomas, F. D., Blomberg, R. D., Stutts, J. S., Wilkins, J. W., Treffers, R., Taylor, E., & McKnight, A. S. (2024, August). *State laws on school bus passing* (Report No. DOT HS 813 603). National Highway Traffic Safety Administration..
- Wright, T. J., Smith, S. A., Thomas, F. D., Blomberg, R. D., Stutts, J. S., Wilkins, J. W., Treffers, R., Taylor, E., & McKnight, A. S. (2024, August). *State laws on school bus passing* (Report No. DOT HS 813 603). National Highway Traffic Safety Administration.



## **Appendix A: Community Awareness/Knowledge Survey**

What is your age?  
\_\_\_\_\_ years

1) Did you drive on one or more days during the last 12 months?

- Yes
- No

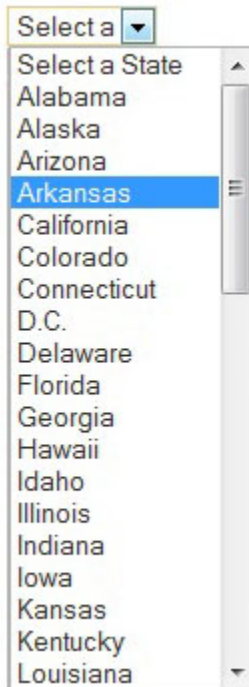
2) How often did you drive in the past 12 months?

- Every day
- Almost every day
- A few days a week
- A few days a month
- A few days total

3) Do you have a current (not expired) driver's license?

- Yes
- No, but I used to
- No, I never have

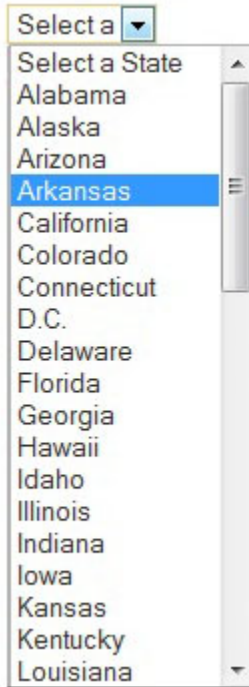
4) Where is your current, or most recent, driver's license from?



Select a State

- Alabama
- Alaska
- Arizona
- Arkansas
- California
- Colorado
- Connecticut
- D.C.
- Delaware
- Florida
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana

5) In what State do you drive the most miles?



Select a State

- Alabama
- Alaska
- Arizona
- Arkansas
- California
- Colorado
- Connecticut
- D.C.
- Delaware
- Florida
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana

6) What do you drive most often?

- Car
- Van or minivan
- Motorcycle
- Pickup truck
- Sport Utility Vehicle (SUV)
- Other truck
- Other


7) When you drive, how often do you see a school bus on the road?


- Always
- Almost always
- Sometimes
- Rarely
- Never

8) How confident are you in your knowledge of the vehicle and traffic laws in your State?

- Extremely confident
- Very confident
- Moderately confident
- Slightly confident
- Not at all confident

For the next 7 questions, you will first be shown a brief video of a driver's view approaching a school bus on various types of roadways. Your video will automatically begin playing shortly after you move to the next screen.

If your video does not automatically begin playing, please click the play icon  to start the video.

Choose the replay icon  to see the video again or click CONTINUE to answer a question based on the situation shown in the video.

Instructions for watching your video:

- Do not fast forward through the video.
- Do not skip past the video before viewing it once.
- You may re-watch the video multiple times.
- If your video does not automatically begin playing, please click on the play icon to start watching the video.
- The video is best viewed horizontally if watched on a mobile phone.

Situation 1: Video of a car approaching a school bus stopped on a 2-lane undivided roadway from the rear as its red lights and stop-arm deploy. The video dissolves before the car reaches the school bus.

- 9) What does the law say a driver must do in this situation?
- Nothing special
  - Proceed with caution
  - Slow down
  - Yield to children
  - Stop, look, and go
  - Stop and stay stopped

Situation 2: Video of a car approaching a school bus stopped on a 2-lane undivided roadway from the front as its red lights and stop-arm deploy. The video dissolves before the car reaches the school bus.

- 10) What does the law say a driver must do in this situation?
- Nothing special
  - Proceed with caution
  - Slow down
  - Yield to children
  - Stop, look, and go
  - Stop and stay stopped

Situation 3: Video of a car approaching a school bus stopped on a 4-lane undivided roadway from the rear as its red lights and stop-arm deploy. The video dissolves before the car reaches the school bus.

11) What does the law say a driver must do in this situation?

- Nothing special
- Proceed with caution
- Slow down
- Yield to children
- Stop, look, and go
- Stop and stay stopped

Situation 4: Video of a car approaching a school bus stopped on a 4-lane undivided roadway from the front as its red lights and stop-arm deploy. The video dissolves before the car reaches the school bus.

12) What does the law say a driver must do in this situation?

- Nothing special
- Proceed with caution
- Slow down
- Yield to children
- Stop, look, and go
- Stop and stay stopped

Situation 5: Video of a car approaching a school bus stopped on a 4-lane divided (by a clearly discernible physical median) roadway from the front as its red lights and stop-arm deploy. The video dissolves before the car reaches the school bus.

13) What does the law say a driver must do in this situation?

- Nothing special
- Proceed with caution
- Slow down
- Yield to children
- Stop, look, and go
- Stop and stay stopped

Situation 6: Video of a school bus stopped as the last bus in a line of buses in a school driveway with its red lights flashing and stop-arm extended. In the video, a car approaches the school bus from the rear. The video dissolves before the car reaches the school bus.

14) What does the law say a driver must do in this situation?

- Nothing special
- Proceed with caution
- Slow down
- Yield to children
- Stop, look, and go
- Stop and stay stopped

Situation 7: Video of a car following a school bus on a 4-lane undivided roadway from the rear as its yellow lights start to flash. The video dissolves before the car reaches the school bus.

15) What does the law say a driver must do in this situation?

- Nothing special
- Proceed with caution
- Slow down
- Yield to children
- Stop, look, and go
- Stop and stay stopped

16) Where you live, can cameras on school buses be used to enforce laws against passing a stopped school bus with its red lights flashing and its stop-arm out?

- Yes
- No
- Not sure

17) In some States, when a vehicle illegally passes a school bus, the registered owner of the vehicle can be mailed a ticket regardless of who was operating the vehicle. How much do you agree with this approach?

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

18) What do you think causes most drivers to pass a stopped school bus with its red lights flashing and stop-arm extended?

- They didn't know the law
- They thought the law was unnecessary
- They were in a hurry
- They didn't care
- They didn't see the bus
- They were distracted
- They were drowsy or impaired
- The bus driver made a mistake
- Other, please specify: \_\_\_\_\_

19) What do you think is the best way to prevent a driver from illegally passing a stopped school bus?

- Police patrols near the school bus
- Police riding on the school bus
- Camera enforcement
- Stricter penalties
- More publicity of the laws
- Larger stop-arm
- More or brighter lights on school bus
- Better driver education
- Other, please specify: \_\_\_\_\_

20) What should the penalty be for a driver who goes past a stopped school bus with its red lights flashing and its stop-arm out?

- No penalty
- A warning
- A fine but no points on their license
- A fine *and* points on their license
- License suspension
- Lose their license forever
- Jail time
- Other, please specify: \_\_\_\_\_

21) How many children do you have in each of the following age categories?

\_\_\_\_\_ Over 18 years of age

\_\_\_\_\_ Between 4 and 18 years of age

\_\_\_\_\_ Less than 4 years of age

(If at least one child is between "4 and 18 years of age," go to 22. Otherwise, go to 23.)

22) Do any of your children ride school buses to or from school?

- Yes
- No

23) When you were going to school yourself, did you ever ride the school bus to or from school?

- Yes
- No

24) In the last 6 months, have you seen or heard anything in the regular media (TV, radio, newspapers, etc.) or social media (Facebook, Instagram, Twitter, local web sites, etc.) about getting a ticket for passing a stopped school bus with its red lights on and stop-arm extended?

- Yes
- No
- Unsure

25) Where did you see or hear it? What did it say? (*Answer all that apply*)

**Where**

- TV
- Radio
- Newspaper
- Signs
- Social media (Facebook, etc.)
- Website
- Directly from another person
- Other

**What**

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26) What is the penalty where you live if you are convicted for the first time for illegally passing a stopped school bus?

- Nothing
- Less than \$100
- \$100 - \$249
- \$250 - \$459
- \$500 or more
- License suspension
- Lose your license forever
- Jail time
- Unsure



27) Can drivers where you live get points on their license if convicted of illegally passing a stopped school bus?

- Yes
- No
- Unsure

28) What is your sex?

- Male
- Female

29) What is your marital status?

- Married
- Widowed
- Divorced
- Separated
- Never Married
- Living with partner

30) Are you of Hispanic or Latino origin?

- Yes
- No

31) What is your race? *Select all that apply.*

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White

32) What is the highest degree or level of school you have completed?

- No formal education
- 8<sup>th</sup> grade or less
- Some high school (no diploma)
- High School Graduate
- Some college, no degree
- Associate degree
- Bachelor's degree
- Master's degree
- Professional or Doctorate degree

33) What is your zip code?

\_\_\_\_\_

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## **Appendix B: Supplemental Results**

Table B-1. Description of Sample

	Allentown		Bethlehem	
	Pre % (n = 273)	Post % (n = 423)	Pre % (n = 210)	Post % (n = 298)
<b>Age</b>				
18-34	46.9	43.3	45.7	38.3
35-49	23.8	29.3	27.6	27.2
50-64	22.7	15.1	19.0	19.5
65+	6.6	12.3	7.6	15.1
<b>Sex</b>				
Male	43.2	34.8	28.6	36.9
Female	56.8	65.2	71.4	63.1
<b>Marital Status</b>				
Married	38.1	40.9	42.9	47.0
Widowed	4.4	3.5	4.8	3.4
Divorced	9.9	9.2	3.8	8.4
Separated	4.8	10.9	3.3	5.4
Never Married	33.0	22.9	27.6	26.2
Living w/ partner	9.9	12.5	17.6	9.7
<b>Hispanic/Latino Origin</b>				
Yes	21.6	24.6	31.9	27.9
No	78.4	75.4	68.1	72.1
<b>Race (select all that apply)</b>				
American Indian or Alaska Native	4.8	5.2	3.8	4.4
Asian	8.8	9.9	3.8	4.0
Black or African American	12.8	20.3	20.0	9.1
Native Hawaiian or Other Pacific Islander	6.6	5.0	2.4	7.7
White	71.8	66.0	74.8	78.5

	Allentown		Bethlehem	
	Pre % (n = 273)	Post % (n = 423)	Pre % (n = 210)	Post % (n = 298)
<b>Education</b>				
No formal education	0.0	1.9	0.5	0.7
8th grade or less	0.4	1.4	0.0	0.3
Some high school	2.9	6.4	2.4	2.0
High School Graduate	21.6	19.1	26.2	16.4
Some college	18.7	16.5	15.2	21.1
Associate degree	12.5	15.1	18.1	13.4
Bachelor's degree	26.4	18.4	25.2	28.2
Master's degree	11.0	13.2	10.5	14.4
Professional or Doctorate degree	6.6	7.8	1.9	3.4

Table B-2 presents campaign awareness before and after the campaign separately by site. While both sites showed increases in the percentage of people indicating they had seen or heard something about illegally passing a stopped school bus, only the Allentown difference was statistically significant,  $\chi^2(2, N = 696) = 9.516, p = .009$ .

*Table B-2. School Bus Enforcement Pre/Post Campaign Awareness*

	Allentown				Bethlehem			
	Pre (n = 273)		Post (n = 423)		Pre (n = 210)		Post (n = 298)	
	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)
Yes	12.5	[8.9, 16.8]	18.7*	[15.2, 22.6]	15.2	[10.9, 20.6]	21.8	[17.4, 26.8]
No	56.8	[50.9, 62.6]	59.6	[54.8, 64.2]	75.2*	[69.1, 80.7]	64.8	[59.2, 70.0]
Unsure	30.8*	[25.5, 36.4]	21.7	[18.0, 25.9]	9.5	[6.1, 14.0]	13.4	[9.9, 17.6]

\*Statistically significant difference from pre to post,  $p < .05$ .

Table B-3 presents responses about whether cameras were permissible for enforcement before and after the campaign separately by site. Allentown showed an increase in both yes and no responses,  $\chi^2(2, N = 696) = 35.395, p < .001$ , while there were no significant changes over time in Bethlehem.

Table B-3. School Bus Pre/Post Camera Permissibility of School Bus Enforcement Cameras

	Allentown				Bethlehem			
	Pre (n = 273)		Post (n = 423)		Pre (n = 210)		Post (n = 298)	
	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)
Yes	31.1	[25.9, 36.8]	48.7*	[44.0, 53.5]	56.7	[49.9, 63.2]	53.7	[48.0, 59.3]
No	5.5	[3.2, 8.7]	10.9*	[8.2, 14.1]	4.3	[2.1, 7.7]	1.7	[0.6, 3.6]
Unsure	63.4*	[57.5, 68.9]	40.4	[35.8, 45.2]	39.0	[32.6, 45.8]	44.6	[39.1, 50.3]

\*Statistically significant difference from pre to post,  $p < .05$ .

Table B-4 presents responses about penalties before and after the campaign separately by site. A significant difference was found for Allentown,  $\chi^2 (8, N = 696) = 21.720, p = .005$ , and in Bethlehem,  $\chi^2 (7, N = 508) = 18.241, p = .011$ . Bethlehem showed an increase in the percentage of people who reported the correct answer (i.e., \$250 to \$459) from before (8.6%) to after (14.4%) the campaign. The percentage of people who reported the correct answer did not change in Allentown.

Table B-4. Pre/Post Penalty for Illegal Passing by Site

	Allentown				Bethlehem			
	Pre (n = 273)		Post (n = 423)		Pre (n = 210)		Post (n = 298)	
Nothing	0.4	[0.0, 1.7]	0.9	[0.3, 2.2]	2.4	[0.9, 5.1]	2.0	[0.8, 4.1]
Less than \$100	3.7	[1.9, 6.4]	8.5*	[6.1, 11.5]	2.9	[1.2, 5.8]	5.4	[3.2, 8.4]
\$100 - \$249	6.2	[3.8, 9.6]	9.5	[6.9, 12.5]	8.6	[5.3, 12.9]	8.1	[5.4, 11.6]
\$250 - \$459	10.3	[7.1, 14.3]	9.2	[6.7, 12.3]	8.6	[5.3, 12.9]	14.4*	[10.8, 18.8]
\$500 or more	3.7	[1.9, 6.4]	6.1	[4.2, 8.7]	5.7*	[3.2, 9.5]	1.0	[0.3, 2.7]
License suspension	3.7	[1.9, 6.4]	5.2	[3.4, 7.6]	4.8	[2.5, 8.3]	2.3	[1.1, 4.6]
Lose your license forever	0.0	n/a	1.4	[0.6, 2.9]	0.5	[0.1, 2.2]	0.0	n/a
Jail time	0.0	n/a	0.5	[0.1, 1.5]	0.0	n/a	0.0	n/a
Unsure	72.2*	[66.6, 77.2]	58.6	[53.9, 63.3]	66.7	[60.1, 72.8]	66.8	[61.3, 71.9]

\*Statistically significant difference from pre to post,  $p < .05$ .

Table B-5 presents opinions on prevention approaches before and after the campaign separately by site. Again, no significant difference was found before and after the campaign at either site, with  $\chi^2 (9, N = 696) = 10.665, p = .299$  for Allentown and  $\chi^2 (8, N = 508) = 10.876, p = .209$  for Bethlehem. In both sites, camera enforcement, stricter penalties and more publicity of the laws were the top three reported approaches both before and after the campaign.

Table B-5. Opinion on Illegal Passing Prevention Approaches by Site

	Allentown				Bethlehem			
	Pre (n = 273)		Post (n = 423)		Pre (n = 210)		Post (n = 298)	
	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)
Police patrols near the school bus	9.5	[6.5, 13.4]	10.2	[7.6, 13.3]	11.0	[7.3, 15.7]	8.1	[5.4, 11.6]
Police riding on the school bus	1.8	[0.7, 4.0]	4.5	[2.8, 6.8]	2.4	[0.9, 5.1]	2.3	[1.1, 4.6]
Camera enforcement	24.9	[20.1, 30.3]	23.4	[19.6, 27.6]	35.2	[29.0, 41.9]	32.2	[27.1, 37.7]
Stricter penalties	18.7	[14.4, 23.6]	24.6	[20.7, 28.9]	23.8	[18.4, 29.9]	19.8	[15.6, 24.6]
More publicity of the laws	18.7	[14.4, 23.6]	15.6	[12.4, 19.3]	14.8	[10.5, 20.0]	20.5	[16.2, 25.3]
Larger stop-arm	10.3	[7.1, 14.3]	8.5	[6.1, 11.5]	2.4	[0.9, 5.1]	5.0	[3.0, 8.0]
More or brighter lights on school bus	2.6	[1.2, 5.0]	1.9	[0.9, 3.5]	2.9	[1.2, 5.8]	2.0	[0.8, 4.1]
Better driver education	12.1	[8.6, 16.3]	9.0	[6.5, 12.0]	5.7	[3.2, 9.5]	9.4	[6.5, 13.1]
Other	1.5	[0.5, 3.4]	2.1	[1.1, 3.8]	1.9	[0.6, 4.5]	0.7	[0.1, 2.1]
(Skipped item)	0.0	n/a	0.2	[0.0, 1.1]	0.0	n/a	0.0	n/a

\*Statistically significant difference from pre to post,  $p < .05$ .

Table B-6 presents respondent agreement with tickets to registered owner before and after the campaign separately by site. A significant difference was found for Allentown,  $\chi^2(4, N = 696) = 11.745, p = .019$ . No significant difference was found for Bethlehem,  $\chi^2(4, N = 508) = 4.252, p = .373$ . As shown in Table B-6, the percentage of people in Allentown who strongly disagreed with the approached of the registered owner of a violating vehicle receiving a ticket decreased significantly from 7.0% before the campaign to 3.1 percent after it. In Bethlehem, there were no significant differences found.

Table B-6. Agreement With Tickets to Registered Owner by Site

	Allentown				Bethlehem			
	Pre (n = 273)		Post (n = 423)		Pre (n = 210)		Post (n = 298)	
	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)
Strongly agree	44.7	[38.9, 50.6]	48.9	[44.2, 53.7]	60.5	[53.8, 66.9]	61.4	[55.8, 66.8]
Somewhat agree	24.2	[19.4, 29.5]	22.9	[19.1, 27.1]	20.0	[15.0, 25.8]	19.8	[15.6, 24.6]
Neither agree nor disagree	12.8	[9.3, 17.2]	17.7	[14.3, 21.6]	5.2	[2.8, 8.9]	6.7	[4.3, 10.0]
Somewhat disagree	11.4	[8.0, 15.5]	7.3	[5.1, 10.1]	9.5	[6.1, 14.0]	5.4	[3.2, 8.4]
Strongly disagree	7.0*	[4.4, 10.4]	3.1	[1.7, 5.1]	4.8	2.5, 8.3	6.7	[4.3, 10.0]

\*Statistically significant difference from pre to post,  $p < .05$ .

Table B-7 presents the reported opinion on penalties before and after the campaign separately by site. Again, no significant difference was found before and after the campaign in either site, with  $\chi^2 (7, N = 696) = 4.621, p = .706$  for Allentown, and  $\chi^2 (7, N = 508) = 2.237, p = .946$  for Bethlehem.

Table B-7. Opinion on Penalty for Illegal Passing by Site

	Allentown				Bethlehem			
	Pre (n = 273)		Post (n = 423)		Pre (n = 210)		Post (n = 298)	
	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)
No penalty	1.1	[0.3, 2.9]	1.2	[0.5, 2.6]	1.0	[0.2, 3.0]	1.7	[0.6, 3.6]
A warning	15.4	[11.5, 20.0]	11.6	[8.8, 14.9]	8.6	[5.3, 12.9]	7.4	[4.8, 10.8]
A fine but no points on their license	25.6	[20.7, 31.1]	26.2	[22.2, 30.6]	31.9	[25.9, 38.4]	28.9	[23.9, 34.2]
A fine <i>and</i> points on their license	38.8	[33.2, 44.7]	43.0	[38.4, 47.8]	45.7	[39.1, 52.5]	48.7	[43.0, 54.3]



	Allentown				Bethlehem			
	Pre ( <i>n</i> = 273)		Post ( <i>n</i> = 423)		Pre ( <i>n</i> = 210)		Post ( <i>n</i> = 298)	
	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)	%	95% CI (%)
License suspension	12.1	[8.6, 16.3]	11.8	[9.0, 15.2]	9.5	[6.1, 14.0]	10.4	[7.3, 14.2]
Lose their license forever	2.9	[1.41, 5.5]	2.4	[1.2, 4.2]	1.4	[0.4, 3.8]	0.7	[0.1, 2.1]
Jail time	1.5	[0.5, 3.4]	2.4	[1.2, 4.2]	0.5	[0.1, 2.2]	0.7	[0.1, 2.1]
Other	2.6	[1.2, 5.0]	1.4	[0.6, 2.9]	1.4	[0.4, 3.8]	1.7	[0.6, 3.6]

\*Statistically significant difference from pre to post,  $p < .05$ .

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