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16. Abstract

A direct observation study was conducted in Spring 2007 to evaluate the statewide "Click It or Ticket" (CIOT) safety belt mobilization in Florida. The study consisted of two survey waves: a baseline wave completed before CIOT activities began, and a follow-up survey completed immediately following the termination of the activities. Both survey waves were conducted statewide on front-outboard motor vehicle occupants traveling in four vehicle types (cars, vans, SUVs, and pickup trucks). Belt use was estimated for all vehicle types combined (the statewide safety belt use rate) for each survey wave. Additional analyses were conducted to determine belt use rates by several occupant and environmental characteristics. Statewide safety belt use was 74.1 percent prior to the mobilization campaign, and 74.2 percent during the follow-up survey wave. These rates were not significantly different from one another. The study results suggest that the CIOT efforts implemented in Florida during 2007 did not have their intended effect.

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS				
Symbol	**When You Know**	**Multiply By**	**To Find**	**Symbol**
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
^oF	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	^oC
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS				
Symbol	**When You Know**	**Multiply By**	**To Find**	**Symbol**
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
^oC	Celsius	1.8C+32	Fahrenheit	^oF
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380. (Revised March 2003)

CONTENTS

List of Tables

List of Figures

INTRODUCTION

In 2005, Florida experienced 2,325 traffic deaths of drivers and passengers in safety belt equipped vehicles. Of those killed, 62.1 percent (1,444 people) were not wearing safety belts (Dickinson, 2005). The number of fatalities in 2005 marked an increase of 8.5 percentage points from the previous year. Motor vehicle crashes not only affect those immediately involved, but the economic costs resulting from crashes have a large impact on society as a whole. In 2000, the estimated total economic cost due to motor vehicle crashes in Florida was $14.4 billion (Blincoe et al., 2002). According to the National Highway Traffic Safety Administration (NHTSA, 2006), 85 percent of all medical costs incurred by crash victims fall on society, not the individuals involved. When crash victims are not properly restrained by a safety belt, their medical treatment costs are 50 percent higher than those who were buckled-up (Blincoe et al., 2002).

Currently, 49 states[1] and the District of Columbia have mandatory safety belt laws (Insurance Institute for Highway Safety, IIHS, 2007). However, only 26 states and the District of Columbia have primary enforcement laws where motorists can be stopped and ticketed solely for not using safety belts. The remaining states, including Florida, have secondary enforcement laws where a vehicle must be pulled over for another infraction before a safety belt citation can be issued. In June 2006, safety belt use in the United States was 81 percent (Glassbrenner & Ye, 2006). States with primary enforcement had a use rate of 85 percent, while secondary states had use rates of 74 percent, an average of 11 percentage points lower. In general, research has shown that for every percentage point increase in safety belt use, approximately 270 lives are saved (NHTSA, 2006). Significant increases are often observed when states upgrade their laws from secondary to primary (see e.g., Cosgrove, Preusser, Preusser, & Ulmer, 1998; Eby, Vivoda, & Fordyce, 2002; Houston & Richardson, 2006; Preusser & Preusser, 1997). The most recent example of this took place in Mississippi. Mississippi strengthened its belt law to allow for primary enforcement and saw a jump in belt use

[1] This excludes New Hampshire where an adult safety belt law does not exist.

from 60.8 percent in 2005 to 73.6 percent in 2006 (NHTSA, 2007). Allowing for primary enforcement enhances the perceived importance of a safety belt use law by both the public and law enforcement community. This enhanced perception ultimately leads to greater compliance (NHTSA, 2006).

Secondary belt use states must rely exclusively on safety belt media and enforcement campaigns to continue to increase belt use. High-visibility police enforcement of the safety belt law is paired with these media messages to get the word out about zero-tolerance enforcement. The most common high-visibility safety belt law enforcement method consists of short-term, intense, highly publicized periods of increased safety belt law enforcement called Selective Traffic Enforcement Programs (sTEPs) (Solomon, Compton & Preusser, 2004). The most successful sTEP program is the widely publicized Click It or Ticket (CIOT) campaign. In 1993, North Carolina became the first state to use the “Click it or Ticket” slogan. Following the program’s success, the slogan was adopted by many other states interested in increasing their belt use rate. For the first time in May 2001, CIOT was fully implemented in NHTSA’s Region IV, which includes Florida. Results from the baseline survey showed belt use to be 60.9 percent. During the two week period following the baseline survey, paid media advertisements were used to promote the message that the safety belt law would be fully enforced. A follow-up survey conducted after the CIOT campaign showed that belt use had risen to 69.5 percent, an 8.6 percentage point increase (Sapolsky, 2001).

Since 2001, Florida has continued to implement the CIOT campaign. The 2007 campaign in Florida was a statewide enforcement initiative surrounding the Memorial Day holiday. This program was coordinated by the Florida Department of Transportation (FDOT) in conjunction with NHTSA and law enforcement agencies across the state. In an effort to increase safety belt usage among Florida motorists during this time, state and local agencies conducted heightened enforcement activities from May 21 to June 3, 2007. Law enforcement officers across the state had a zero tolerance policy toward unbuckled motorists. In addition to increased enforcement, paid media advertisements were utilized to create awareness about the importance of using a safety belt. The advertisements strongly supported the campaign with clear enforcement images and messages. Advertisements were focused on 18-34 year old males, a high-risk group with historically low safety belt use. Approximately $1.9 million was used to purchase television, radio, online, and print media advertisements. Because Florida has a large Spanish speaking population, many of the advertisements were available in both English and Spanish. Officers across the state also held press conferences, distributed promotional items and educational materials about safety belts at various events, and spoke with students at several schools about the importance of belt use.

To properly understand the effects of such a large effort to increase safety belt use statewide, it is essential that the campaign be evaluated. An evaluation can provide important information regarding different aspects of the program to assess which parts have been effective, and which parts might need to be changed in future campaigns. The purpose of the current study was to conduct two statewide direct observation surveys of safety belt use in Florida. The first survey provided baseline safety belt use information before the mobilization began, and the second provided use rates after program completion.

METHODS

The sample design and analysis procedures used during the current survey were developed in 2006 by the Preusser Research Group (PRG) for the Florida Department of Transportation. At the request of FDOT, those methods were used by UMTRI during the two waves of data collection described in this report. Some minor changes were made, and are noted, to allow for greater efficiency. An overall description of study methodology (mostly developed by PRG) is provided here, but details regarding county and site selection, specific analysis procedures, etc. are documented in more detail in a report by Chaffe, Leaf, and Solomon (2006).

To meet federal requirements, all statewide safety belt surveys must follow certain criteria. In accordance with those criteria, the sample design for the current Florida safety belt survey began with a rank ordering of counties by population. To reduce costs, states are permitted to eliminate the lowest population counties from the sample space, as long as those remaining account for at least 85 percent of the state's population. A sample of 12 counties were randomly selected from 24 Florida counties that accounted for 85.8 percent of the state's population. The odds of selection of a county were proportional to the county's population. Roads within the counties were stratified into 4 strata by combining related functional classes of roadways. The resulting strata of roads were: interstates, principal arterials, minor arterials, and collectors. Road segments were sampled from each stratum within a county. The number of road segments (sites) sampled in each county/road stratum was based on a function of the daily vehicle miles of travel (DVMT) of the county and stratum to the total DVMT. The specific road segments for each county/stratum were randomly selected with odds of selection proportional to their DVMT. To ensure accurate data collection within each road segment, a location where traffic slowed or stopped (usually at an intersection) was selected as the actual observation site location. A total of 151 observation sites were chosen for inclusion in the current survey.

To increase efficiency and reduce costs, a new observer schedule of site locations was created prior to the beginning of wave 1 data collection. The new schedule allowed for data to be collected from more sites during a given day of data collection, thus utilizing fewer observers, but still allowing data collection to be completed within a 7-10 day period as specified by FDOT. The same site locations that were used during the 2006 survey were also used during the current survey.

Data Collection

Trained field staff observed shoulder belt use, sex, age, race, hand-held cellular phone use, vehicle type, and vehicle purpose (commercial or noncommercial) of drivers and front-right passengers during daylight hours only. As required by federal guidelines, all vehicle types intended to carry passengers were included in the survey, including cars, vans/minivans, SUVs, and pickup trucks. Semi trucks, RVs, busses, and other large vehicles were excluded. Two waves of data collection were completed, one prior to the CIOT mobilization, and one immediately following those activities. The first wave was conducted between April 24 and May 2, 2007, while the follow-up wave was completed between June 7 and 13.

Data Collection Form

Data were collected during the survey using personal digital assistants (PDAs). For a more detailed description of the PDA data collection process, see Appendix C. One electronic form containing both site description categories and observation categories was developed for data collection. For each site surveyed, one copy of the electronic data collection form was created in advance. The site description portion of the form (completed by observers once per site) allowed observers to provide descriptive information including the site location, observer number, date, day of week, time of day, and weather. A place on the form was also furnished for observers to electronically sketch the intersection and to identify the observation location. A comments section was provided to relate problems or issues relevant to the site or study.

The observation categories of the data collection form were used to record safety belt use, occupant demographic information, and vehicle information for each vehicle surveyed. Children riding in child restraint devices (CRDs) were recorded, but were not included in any part of the analysis.

Procedures at Each Site

All sites in the sample were visited by one observer for a period of one hour. Upon arriving at a site, observers determined whether observations were possible. If observations were not possible (e.g., due to construction), observers contacted one of the field supervisors for an alternate site location. When contacted, the field supervisor followed a pre-determined process to randomly select a new useable site that was near the original. Otherwise, observers completed the site description categories of the form and began observing vehicles.

Observers were instructed to observe vehicles in all lanes of traffic traveling in the same direction on the assigned roadway. During the observation period, observers recorded data for as many eligible vehicles as they could. If traffic flow was heavy, observers were instructed to record data for the first eligible vehicle they saw, and then look up and record data for the next eligible vehicle they saw, continuing this process for the remainder of the observation period. To reduce potential bias, observers were also instructed to try to observe an equal representation of vehicles from all of the assigned lanes of traffic.

Observer Training

Prior to data collection, all field observers participated in intensive training, including both classroom review of data collection procedures and practice field observations. During field training, observers practiced observing safety belt use, identifying the demographic and vehicle categories, as well as practicing with the PDA. Observers were also given specific instruction and practice in properly identifying the age groups and racial categories included in the survey. Each observer also received a training manual containing detailed information on field procedures for observations, PDA use, and administrative policies and procedures. A site schedule identifying the location, date, time, and traffic leg to be observed for each site was included in the manual (see Appendix A for a listing of the sites). Additionally, each observer was provided with maps and driving directions between all sites in their assigned schedule, and all necessary field supplies. Field procedures were reviewed for the final time, and to ensure adherence to study protocols, observers were informed that unannounced site visits would be made by one of the field supervisors during data collection.

Observer Supervision and Monitoring

During data collection, each observer was spot-checked in the field by one of the field supervisors. Contact between the field supervisor and field staff was also maintained on a regular basis through telephone calls to report progress and discuss problems encountered in the field, e-mails to the field supervisor from observers' PDAs containing data from the preceding day, and the unannounced site visits conducted by the field supervisors.

Incoming data files were examined by the field supervisor and problems (e.g., missing data, discrepancies between the data collection form and site listing or schedule) were noted and discussed with field staff. Comments in the site description portion of the data collection form about site-specific characteristics that might affect future surveys (e.g., traffic flow patterns, traffic control devices, site access) were noted.

Data Processing and Estimation Procedures

The accuracy of electronic data was verified by checking for inconsistent codes (e.g., the observation end time occurring before the start time; "no passenger" marked when passenger data were present) and missing data. Any errors noted during this process were corrected.

The overall state safety belt use rate estimation procedures reflected the sampling design and are based on the proportion of the state's total DVMT "represented" by the site. Safety belt use rates were first calculated for each of the four roadway strata within each sample county based on observed safety belt use of drivers and front outboard passengers at sites during the observation periods. County/stratum rates were combined within each county and then weighed by the stratum's relative contribution to the total county DVMT to yield the county safety belt use rate. The rates from the 12 sample counties were then combined into a statewide rate, weighted by their contribution to the state's DVMT and total population. Standard errors were estimated using a jackknife approach. (See Appendix B for more detail on the calculations).

It should be noted that while safety belt use rates for various subgroups (i.e., by sex, age, race, vehicle type) are of interest, the survey was designed to obtain the overall use rate only. The distribution of occupant subgroups and vehicle types across counties and roadway strata is unknown and most likely not equal, and weights for the various subgroups cannot be determined. In such cases, an unweighted average of the observations is a reasonable simple estimate and is provided in the results section of this report.

RESULTS

The current evaluation was comprised of two statewide waves of direct observation data collection: a baseline survey completed prior to the beginning of the CIOT mobilization activities, and a follow-up survey that began immediately following the mobilization.

Overall Safety Belt Use

As shown in Table 1, during the baseline wave of data collection, 74.1 ± 1.7 percent of all front-outboard occupants were restrained with shoulder belts, while 74.2 ± 1.6 percent were belted during the post-mobilization wave. The "±" value following the use rate indicates a 95 percent confidence interval around the percentage. When comparing these two rates with one another, we find that belt use remained statistically unchanged across the mobilization period.

Table 1. Weighted Safety Belt Use and Unweighted N by Wave

	Wave 1: Pre-Mobilization			***Wave 2: Post-Mobilization***		
	Percent Use	N	Vehicle N	Percent Use	N	Vehicle N
Overall Statewide	74.1 ± 1.7	25,320	20,238	74.2 ± 1.6	22,397	17,992

Figure 1 shows the results of the current survey waves as well as results from annual statewide surveys conducted in Florida since 1993 (Chaffe, Leaf, & Solomon, 2006). As the figure shows, there is a general upward trend in belt use since 1993, but the state still lags behind the national average belt use rate of 81 percent (Glassbrenner & Ye, 2006). The 2007 rates of 74.1 and 74.2 also seem to represent a downward trend in belt use compared to the rate of 80.7 percent observed in Florida during 2006 (Chaffe, Leaf, & Solomon, 2006).

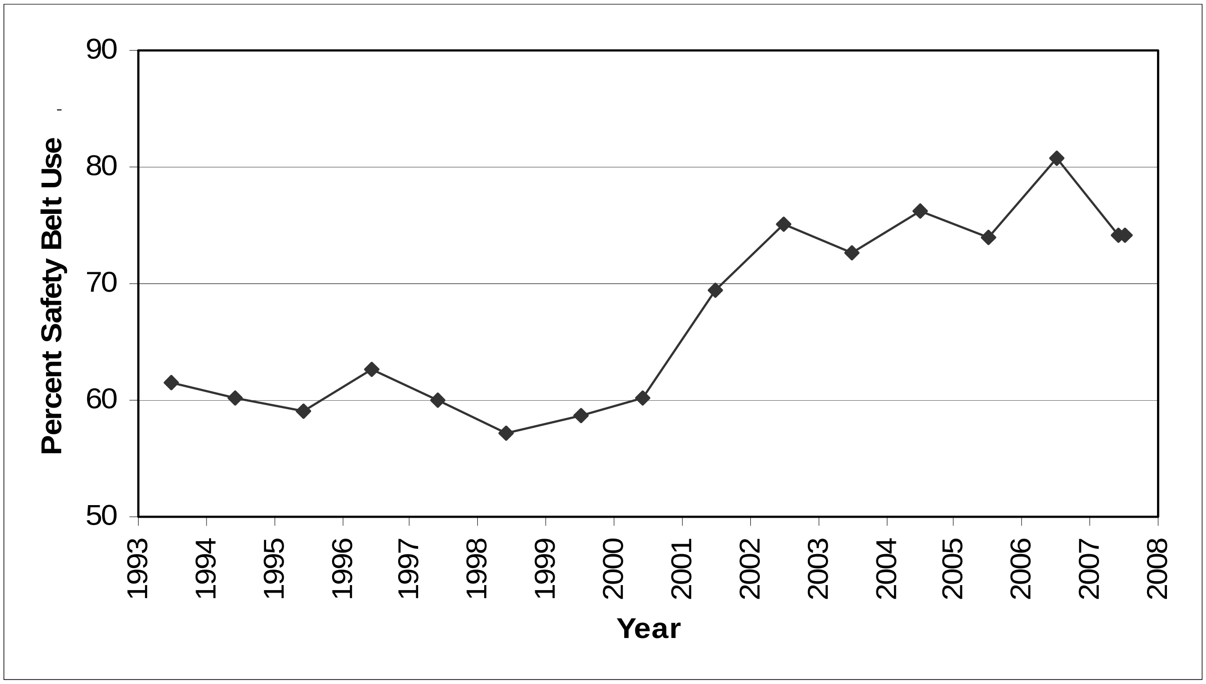

Figure 1. Florida Statewide Safety Belt Use: 1993 - 2007

Seating Position

Weighted safety belt use rates and numbers of occupants (N) by seating position are shown in Table 2. During both survey waves, safety belt use was essentially the same for drivers and passengers. Comparisons across the mobilization period reveal that belt use also stayed the same within each seating position.

Table 2. Weighted Safety Belt Use and Unweighted N by Wave and Seating Position

	Wave 1: Pre-Mobilization		***Wave 2: Post-Mobilization***	
	Percent Use	N	Percent Use	N
Seating Position				
Driver	74.1	20,238	74.0	17,992
Passenger	73.4	5,091	74.6	4,408

Estimated belt use rates and numbers of occupants (N) by occupant characteristics and survey wave are presented in Table 3. As described earlier, only unweighted rates are provided for all subgroups. Since confidence intervals are not available for these groups, comparisons between the various rates should be made with caution. In addition, comparing unweighted subgroup rates to the overall weighted rates can be problematic because the methods of arriving at the rates are different.

Sex

Safety belt use for females was approximately 10 percentage points higher than for males during both survey waves. Similar results have been previously observed in Florida (Chaffe, Leaf, & Solomon, 2006), other states (see e.g., Eby, Vivoda, & Cavanagh, 2006; Eby, Vivoda, & Fordyce, 2002), as well as in national surveys (Glassbrenner & Ye, 2007). When comparing within each sex across the waves, belt use remained essentially unchanged.

Age

During both survey waves, very few occupants in the 0-3 year old age group were observed. As such, belt use rates for this group would not be meaningful and those data have been removed from the age analysis. Additionally, the numbers of 4-15 year olds was also quite low (412 and 383 for waves 1 and 2, respectively), so those results should be interpreted with caution. Excluding the youngest age groups, the lowest level of safety belt use was observed among 16-29 year olds, and increased with age within each survey wave. These results suggest that new and young drivers (16-29 years of age) should continue to be a focus of safety belt use messages and programs. While comparing across the mobilization period, there appear to be minor increases among the 4-15 and 16-29 year old age groups, however it is not possible to determine if these changes are statistically significant without a confidence interval for comparison. The belt use rates for the two older age groups remained unchanged.

Race

During both survey waves, relatively few occupants (365 and 317 respectively, for waves 1 and 2) were identified as “Other” race, so results from this group should be interpreted with caution. However, the belt use rate of Other motorists was the highest of the various racial groups during both survey waves. Motorists identified as White were next highest, followed by those identified as Hispanic. Motor vehicle occupants identified as Black were least likely to use a safety belt during both survey waves. These results are similar to work conducted previously in Florida (Chaffe, Leaf, & Solomon, 2006) and elsewhere (see e.g., Glassbrenner & Ye, 2007; Vivoda, Eby, & Kostyniuk, 2004). When comparing within the racial categories across the survey waves, belt use rates for White and Hispanic motorists remained essentially unchanged, with slight increases observed among Black and Other motor vehicle occupants.

Vehicle Type

Within each survey wave, the highest belt use rate by vehicle type was noted among those traveling in SUVs. These rates were followed closely by occupants of vans/minivans and those in passenger cars. As is typically found in safety belt research, the belt use rate of those traveling in pickup trucks was substantially lower than those observed in the other vehicle types (see e.g., Eby, Vivoda, & Fordyce, 2002; Glassbrenner & Ye, 2006). The comparisons across the mobilization period reveal very slight changes within each vehicle type. Slightly higher rates were observed during wave 2 for those traveling in cars and SUVs, while a slight decrease was observed for pickup truck occupants. Belt use for occupants of vans remained unchanged across the mobilization period.

Table 3. Unweighted Safety Belt Use and Unweighted N by Wave and Occupant Characteristics				
	Wave 1: Pre-Mobilization		***Wave 2: Post-Mobilization***	
	Percent Use	N	Percent Use	N
Sex				
Male	69.6	13,812	70.2	12,430
Female	79.4	11,490	80.5	9,948
Age				
4 - 15	77.7	412	79.4	383
16 - 29	64.8	6,639	68.0	6,242
30 - 59	75.9	14,861	75.9	12,899
60 - Up	83.9	3,370	84.0	2,853
Race				
White	77.0	17,217	77.6	14,803
Black	62.1	3,990	64.2	3,629
Hispanic	72.5	3,736	73.1	3,624
Other	82.5	365	84.5	317
Vehicle Type				
Car	74.5	13,371	76.0	11,662
Van	77.3	2,824	77.0	2,471
SUV	78.3	5,496	79.2	5,043
Pickup	63.6	3,629	61.6	3,221

Age and Sex Combined

Estimated belt use rates and numbers of occupants (N) by age and sex combined are shown in Table 4. Within each survey wave, safety belt use is higher for females than for males of all ages. The smallest difference in belt use between the two sexes is noted for 4-15 year olds. For motor vehicle occupants within this age group, the decision of whether or not to use a safety belt is often influenced by a parent in the vehicle. This influence may account for the relatively minor difference in belt use noted between these groups. However, as mentioned earlier, the number of 4-15 year old occupants observed within each wave of the survey is quite low, so these results should be interpreted with caution. During both the pre-mobilization and post-mobilization waves, the largest difference between the two sexes was observed within the 16-29 year old age group (13.1 and 15.0 percent, respectively). In fact, one of the lowest rates observed among any group in the survey (58.3 percent) was noted during wave 1 among 16-29 year old males. Conversely, a use rate of nearly 90 percent (89.7) was observed during wave 2, among females aged 60 and above. These results suggest that not only young drivers in general, but particularly young male drivers should continue to be a focus of efforts designed to increase belt use. The comparisons across the waves show slight differences in belt use within each group, however these differences are not likely to be statistically significant.

Table 4. Unweighted Safety Belt Use and Unweighted N by Wave and Age and Sex Combined

	Wave 1: Pre-Mobilization				***Wave 2: Post-Mobilization***			
	Male		Female		Male		Female	
	Percent Use	N	Percent Use	N	Percent Use	N	Percent Use	N
Age								
4 - 15	75.0	224	80.8	187	78.7	207	80.1	176
16 - 29	58.3	3,314	71.4	3,321	60.6	3,153	75.6	3,084
30 - 59	71.5	8,397	81.5	6,452	71.9	7,399	81.3	5,488
60 - Up	80.6	1,856	87.9	1,514	79.8	1,662	89.7	1,189

Estimated safety belt use rates and numbers of occupants (N) by wave and environmental characteristics are shown in Table 5.

Region and County

During both survey waves, safety belt use was highest in the Southern counties, followed by the Central counties, and was lowest in the Northern counties. However, regional comparisons during the post-mobilization wave reveal that the overall differences between the regions decreased. Across the mobilization period belt use increased in the Northern counties, remained the same in the Central counties, and decreased slightly in the Southern counties.

Roadway Type

During both waves of data collection, belt use was highest for motorists traveling on interstates and lowest for those traveling on collector roads. Safety belt use for motorists traveling on the other two types of roadways was about two percentage points different during wave 1, and nearly identical during wave 2. Comparing across waves revealed only minor differences for those traveling on interstates, principal arterials, and minor arterials. An increase of 3.7 percentage points was noted among motor vehicle occupants observed on collectors.

Day of Week

The analysis of safety belt use by day of week revealed that within each survey wave belt use clearly varied from day to day, but no systematic differences were evident. Across the mobilization period, changes in belt use by day of week were noted, but no obvious pattern or explanation for these differences is apparent.

Time of Day

Following federal guidelines, observations during the current survey were only conducted during daylight hours. During wave 1, safety belt use appeared to be slightly higher during the morning and evening rush hours. During wave 2, belt use clearly varied throughout the day, but no systematic trends were evident.

Weather

There was essentially no difference in belt use observed during clear/sunny or cloudy weather conditions during either wave or across the mobilization period. However during wave 2, belt use appeared to be slightly higher during rainy conditions.

Table 5. Unweighted Safety Belt Use and Unweighted N by Wave and Environmental Characteristics				
	Wave 1: Pre-Mobilization		***Wave 2: Post-Mobilization***	
	Percent Use	N	Percent Use	N
Region and County				
North	**68.3**	**6,398**	**72.5**	**4,867**
Duval County	66.4	3,501	70.2	2,455
Leon County	68.1	1,554	73.8	1,043
Marion County	73.3	1,343	75.7	1,369
Central	**73.2**	**9,114**	**73.5**	**5,868**
Hillsborough County	73.0	2,434	70.9	1,641
Orange County	75.1	2,600	77.7	1,823
Pinellas County	72.9	2,975	70.9	1,464
Polk County	69.8	1,105	74.0	940
South	**78.7**	**9,808**	**76.4**	**11,662**
Broward County	82.4	2,721	76.9	3,707
Collier County	81.9	1,034	81.4	1,279
Lee County	75.4	948	76.1	1,617
Miami-Dade County	74.9	2,900	77.0	2,747
Palm Beach County	78.8	2,205	72.1	2,312
Roadway Type				
Interstate	77.2	6,859	76.9	6,497
Principal Arterial	75.2	7,242	74.2	6,164
Minor Arterial	73.1	7,149	74.7	6,166
Collector	68.4	4,070	72.1	3,570
Day of Week				
Monday	69.0	3,273	73.4	3,795
Tuesday	74.3	3,731	74.3	2,871
Wednesday	77.1	4,416	77.3	2,469
Thursday	76.1	4,731	71.7	1,857
Friday	76.1	2,934	73.7	3,467
Saturday	69.6	3,639	74.9	4,521
Sunday	75.2	2,596	77.6	3,417
Time of Day				
7 am - 9 am	71.3	1,267	75.7	1,190
9 am - 11 am	76.3	5,307	74.7	4,258
11 am - 1 pm	73.9	6,002	76.8	4,370
1 pm - 3 pm	71.1	5,363	73.4	4,668
3 pm - 5 pm	74.4	5,504	73.9	4,697
5 pm - 7 pm	77.6	1,877	72.9	2,447
After 7 pm	---	0	82.3	767
Weather				
Clear/Sunny	74.1	22,007	74.3	15,515
Mostly Cloudy	73.8	3,313	75.0	5,754
Rain	---	0	80.3	1,128

During data collection, observers also noted whether or not motorists were conversing on hand-held cellular phones. These results are presented in Table 6. As is shown in this table, hand-held cellular phone use by drivers was much more common (about 9 percent) than use by front-right passengers (2-3 percent). These results are somewhat higher than the rates observed in studies conducted in other states where a rate of 3.1 percent was found in North Carolina (Stutts, Huang, & Hunter, 2002), 5.8 percent in Michigan (Eby, Vivoda, & St. Louis, 2006), and 4.7 percent in Minnesota (Eby & Vivoda, 2006). A recent national survey estimated the cellular phone use rate at 6.0 percent (Glassbrenner, 2005). However, since cellular phone ownership and use continues to climb, the higher rates observed in the current survey may simply reflect the fact that the current survey is more recent than the others.

Table 6. Unweighted Hand-held Cellular Phone Use and Unweighted N by Wave

	Wave 1: Pre-Mobilization		***Wave 2: Post-Mobilization***	
	Percent Use	N	Percent Use	N
Cellular Phone Use				
Drivers	8.9	20,238	9.0	17,992
Passengers	2.8	5,091	2.2	4,408

DISCUSSION

As described earlier, the main purpose of this study was to evaluate efforts designed to increase Florida safety belt use on a statewide level. Surrounding the Memorial Day holiday, Florida implemented a statewide CIOT mobilization to run concurrently with national efforts designed to increase safety belt use. During the pre-mobilization wave of the study, statewide safety belt use was estimated to be 74.1 ± 1.7 percent. During the post-mobilization wave, an estimated rate of 74.2 ± 1.6 percent was found. Since the statewide belt use rate remained unchanged across the mobilization period, these results suggest that the CIOT activities implemented in Florida did not have their intended effect. Surprisingly, the safety belt use rates identified during both waves of the current survey were somewhat lower than the observed rate of 80.7 percent recorded in 2006 (Chaffe, Leaf, & Solomon, 2006). There is no obvious explanation for the apparent decrease in safety belt use since last year, however it would be interesting to note any differences in the CIOT activities, or public awareness of those activities between the two efforts. For example, during the 2006 campaign, about 46,000 occupant protection citations were issued (FDOT, 2007), but during the 2007 CIOT activities, 28,788 citations were written (A. Dawson, FDOT, personal communication, July 5, 2007).

The study also examined safety belt use by survey wave and several occupant and environmental characteristics. The analyses by demographic characteristics showed some slight increases that may also indicate a positive result. While the sampling scheme and analysis procedures do not allow for statistical comparisons, an increase in the unweighted rate was noted within several groups. For example, the comparison of the belt use rates by age across the mobilization period revealed that there was an increase within the 16-29 year old age group. This is a promising result since that age group was specifically targeted by the 2007 CIOT messages. Another slight increase was noted among motor vehicle occupants identified as Black or Other. This result is also promising since Black motorists had the lowest rate of the various racial groups. However, even with the increases in the unweighted rates, motorists in the 16-29 year old age group and motorists identified as Black continue to have lower belt use rates than their comparison groups, so efforts to increase belt use should continue to focus on these groups.

When developing programs to influence specific groups, it is important that the messages are tailored to the groups of interest to ensure the most effective message. NHTSA has recognized that current traffic safety messages for 16-29 year old motorists may not be cognitively appropriate, and has begun an effort to better understand cognitive development and the factors that influence thinking in young drivers (see, e.g., Eby & Molnar, 1999). For this group, it is preferable to present arguments in a positive framework. For example, it is more effective to say, “drive while you are alert and conscientious” than to say “do not drink and drive.” Additionally, young drivers, in particular males, tend to overestimate their driving skills and underestimate the skills of others (optimism bias), and therefore tend to perceive their crash risk as less than that of others; inclusion of peer-group testimonials that address this optimism bias might be effective in overcoming this incorrect reasoning.

Another interesting belt use change during the mobilization period was found within the three regions of the state. Safety belt use increased in the North, remained unchanged in the Central region, and decreased in the South. These results suggest that the implementation of the CIOT mobilization in the North may have been more effective than the implementation in other areas. It may be useful to closely examine how these efforts were conducted in the various regions to identify any potential differences. However, the results may also be due to regional differences in the population of the state. For example, it may be easier to reach the smaller Northern population centered in fewer cities, while the Southern population is larger, more spread out, and contains more Spanish speaking motorists. It is also easier to affect an increase in safety belt use in a population that has a lower rate to begin with (as in the North). While this may explain some of the increase observed in the North, without further research we cannot explain the decrease observed in the South.

No other clear changes were noted across the mobilization period for the other occupant and environmental characteristics. However, within each survey wave, several other typical safety belt use trends were also observed (in addition to the common trends already noted for young occupants and those identified as Black). Males, particularly young males, were much less likely to buckle-up than females, and occupants of pickup trucks used safety belts less often than those in other types of vehicles. To develop the most effective safety belt programs it is also critical to understand why these groups wear safety belts less often than their counterparts.

According to the Motor Vehicle Occupant Safety Survey (MVOSS), when safety belt non-users and part-time users are asked why they do not wear belts, males and females tend to give different reasons (Block, 2000). Males state "I forgot to put it on" as the most important reason for non-use, while females list "I'm only driving a short distance" as the reason most important to them. Males also tend to report non-use for reasons that are related to a lower perception of risk (e.g., low probability of a crash; driving in light traffic), while more of the answers given by female non-users and part-time users are related to discomfort. Traffic safety professionals could use this information for the development of programs aimed at increasing belt use among some of these low belt use groups.

While all of these strategies are important to develop the most effective safety belt programs possible, the easiest way for a secondary enforcement state to increase the belt use rate is to change the enforcement provision of the law to primary. As described earlier, simply making that change often results in significant statewide increases. Making a change to primary enforcement also allows a state to pursue more effective methods of safety belt enforcement. One method that has been very effective is known as a "safety belt enforcement zone." During a typical safety belt enforcement zone, police vehicles from several different agencies (state police, sheriff's office, and local police) work together to create a highly visible area of enforcement along a specific roadway. Each safety belt enforcement zone is clearly marked by a sign denoting the start of the zone. An officer serves as a spotter near the sign and looks for motorists that are not buckled-up. The vehicle information of the unbelted motorist is radioed ahead to other police officers in vehicles further into the zone, where the motorist is stopped and cited. These enforcement efforts are always paired with strong media messages alerting the public to the zero tolerance efforts. By pairing the media with highly visible police activity focused specifically on safety belts, the public learns about the enforcement, and those messages are reinforced when the motorist experiences the zone first hand. Previous research has shown that both components are critical in a successful program.

However, the success of these types of media and enforcement programs is often attributed to the fact that they are specifically focused on safety belts. Unfortunately, since Florida's safety belt law currently allows for only secondary enforcement, traffic safety professionals must pair zero tolerance "safety belt checkpoints" in conjunction with other activities, such as a speeding zone.

While the current evaluation found no statistically significant increase in the overall safety belt use rate across the mobilization period, there were several traditionally low belt use groups where moderate increases were noted. It would be useful to re-evaluate the current implementation of the CIOT activities to see if more effective measures can be utilized in upcoming years. Understanding the reasons why certain groups wear safety belts less often than others, and learning how to best reach those groups would also be useful in planning media and intervention programs in the future.

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APPENDIX A

Site Listing

Site No.	County	Site location
1001	Broward	WB I-75 & SR-84 (Exit 21)
1002	Broward	SB FL Turnpike & W Commercial Blvd/SR-870 (Exit 62)
1003	Broward	NB I-95 & Sheridan St/SR-822 (Exit 21)
1004	Broward	WB I-595 & SR-84 (Exit 5)
1005	Broward	EB I-95 & SR-84 (Exit 25)
1006	Broward	NB I-95 & 60th St/SR-848 (Exit 22)
1007	Broward	WB Sunrise Blvd/SR-838 & Powerline Rd
1008	Broward	NB University Drive/SR-817 & Wiles Road
1009	Broward	NB Pompano Pkwy/SR-845/SW 26th Ave & SW 14th St/Gateway Dr
1010	Broward	EB Griffin Rd/SR-818 & SW 87th Avenue
1011	Broward	SB University Drive/SR-817 & SW 30th
1012	Broward	NB Bonaventure Blvd & Saddle Club Rd
1013	Broward	SB NW 100th Ave/Nob Hill Rd & Oakland Park Blvd/SR-816
1014	Broward	NB SW 101st Ave/SR-847/Palm Ave & Miramar Pkwy/SR-858
1015	Broward	NB Coral Springs & Lakeview Dr
1016	Broward	WB Westview Dr & Coral Springs Dr
1017	Broward	SB Banks Rd/NW 53rd Ave & W Copans Rd/NW 24th St
1018	Broward	NB NE 18th Avenue & NE 6th Street
1101	Collier	EB Alligator Alley (I-75) & SR-29 (Exit 80)
1102	Collier	NB SR 93 / I-75 & Immokalee Rd/CR-846 (Exit 111)
1103	Collier	SEB US-41/SR-90/Tamiami Trail & Collier Blvd/CR-951
1104	Collier	NB US-41/SR-90/Tamiami Trail & Broward Street
1105	Collier	SB Livingston Rd/CR-881 & Pine Ridge Rd/CR-896
1106	Collier	SB Airport Pulling Rd/CR-31 & Poinciana Dr/Grey Oaks Blvd
1107	Collier	EB Radio Rd/CR-856 & Livingston Rd/CR-881
1108	Collier	WB Golden Gate Blvd & Everglades Blvd
1201	Duval	SB I-95 & Golfair Blvd/SR-122 (Exit 355)
1202	Duval	WB SR 8/I-10 & Devoe St (Exit 355)
1203	Duval	EB J.Turner Butler Blvd/SR-202 & Southside Blvd/SR-115
1204	Duval	SB I-295 & Blanding St/SR-21 (Exit 12)
1205	Duval	EB I-10 & Rayford St (Exit 360)
1206	Duval	SB Blanding Blvd/SR-21 & Collins Rd
1207	Duval	NB Roosevelt Blvd/US-17/SR-15 & Yorktown Ave
1208	Duval	NB US-1/SR-5/Philips Hwy & Shad Rd
1209	Duval	NB San Jose Blvd/SR-13 & University Blvd/SR-109
1210	Duval	SB Cassat Ave/SR-111 & Normandy Blvd/SR-228/Post St
1211	Duval	WB 103rd St/SR-134 & Jammes Rd
1212	Duval	EB Lorretto Rd & Chariot Ln
1213	Duval	SB Ocean Blvd & 1st St
1214	Duval	SB Old St. Augustine Rd & Hood Landing Rd
1301	Hillsborough	SB Lee Roy Selmon Expwy & SR-60/US-41 (Exit 8)
1302	Hillsborough	NB I-75 & Big Bend Rd/CR-672 (Exit 246)
1303	Hillsborough	NB Veterans Expressway & Eisenhower Blvd/Memorial Hwy (Exit 3)
1304	Hillsborough	EB I-275 & Lemon St (Exit 40B)
1305	Hillsborough	EB Lee Roy Selmon Expwy & Platt St/Willow Ave (Exit 4)
1306	Hillsborough	NB US-41N Nebraska Ave/SR-45 & Whitaker Rd/Crenshaw Lake Rd
1307	Hillsborough	SB Dale Mabry Hwy N/SR-580/SR-597 & Hamilton Ave
1308	Hillsborough	EB W Martin Luther King Blvd/SR-574 & Burdines Dr
1309	Hillsborough	WB E Brandon Blvd/SR-60 & Valrico Rd
1310	Hillsborough	NB US-41 Bus/SR-685/N Florida Ave & 122nd Ave
1311	Hillsborough	EB Temple Terrace Hwy/CR-580 & N 78th St
1312	Hillsborough	WB Van Dyke Rd & Dale Mabry Hwy/SR-597
1313	Hillsborough	EB W Linebaugh Ave & Mullis City Way
1314	Hillsborough	NB Habana Ave & Silver Lake Ave
1315	Hillsborough	EB E Lake Ave & N 43rd St

1316	Hillsborough	EB E Yukon St & N Renfrew Place
1401	Lee	SB SR 93/I-75 & Bayshore Rd/SR-78 (Exit 143)
1402	Lee	SB SR 93/I-75 & Corkscrew Rd/CR-850 (Exit 123)
1403	Lee	NB US-41/SR-45/Cleveland Ave & South St/Llewellyn Dr
1404	Lee	SB US-41/SR-45/Tamiami Trail & Crown Lake Blvd
1405	Lee	NB US-41/SR-45/Tamiami Trail & Timberwilde Drive/Pelican's Nest Dr
1406	Lee	EB Lee Blvd/CR-884/Joel Blvd & Westgate Blvd/Alvin Ave
1407	Lee	WB Hancock Bridge Pkwy & Cultural Park Blvd
1408	Lee	SB Ortiz Ave/CR-80B & Martin Luther King Blvd/SR-82
1409	Lee	WB Periwinkle Way & Palm Ridge Rd
1410	Lee	SB Ford St & Hanson St
1501	Leon	WB I-10 & US-90/SR-10 (Exit 209)
1502	Leon	WB Apalachee Pkwy/SR-20/US-27 & Kings Dr
1503	Leon	SB S Monroe/US-27/SR-61 & E College Ave
1504	Leon	SB US-90/SR-10/Mahan Dr & Buck Lake Rd/CR-1568
1505	Leon	WB US-90/SR-10 & Blairstone Rd
1506	Leon	SEB Capital Circle/SR-263 & Springhill Rd/SR-373/CR-2203
1601	Marion	NB I-75 & SW 42nd St/College Rd/SR-200 (Exit 350)
1602	Marion	SB I-75 & CR-484 (Exit 341)
1603	Marion	SB US-301/SR-200 & Hwy 318/CR-318
1604	Marion	NB Pine Ave/US-441/US-301 & NW 35th St
1605	Marion	WB NW 10th/US-27/SR-500 & NW 27th St
1606	Marion	WB SR-464/SE 17th St & US-301/US-27
1607	Marion	EB CR-484 & Marion Oaks Blvd
1608	Marion	EB CR-42 & CR-452
1609	Marion	SB CR 315 & SR 40
1701	Miami-Dade	WB FL Turnpike & SW 112 Ave (Exit 9B)
1702	Miami-Dade	NB Florida's Turnpike/H.E.F.T./SR-821 & NW 106th St (Exit 34)
1703	Miami-Dade	NB Don Shula Expwy/SR-874 & SR-94/SW 88th St
1704	Miami-Dade	WB Don Shula Expwy/South Dade Expwy & SR-990/Killian Parkway
1705	Miami-Dade	SB Palmetto Expwy/SR-826 & NW 36th
1706	Miami-Dade	WB Dolphin Expressway/SR-826 & NW 72nd Ave
1707	Miami-Dade	NB 6th Ave & Dixie Hwy/US-1
1708	Miami-Dade	WB Bird Rd/SR-976 & Ponce de Leon Blvd
1709	Miami-Dade	EB N Kendall Dr/SW 88th St/SR-94 & SW 90 Ave
1710	Miami-Dade	NB Collins Ave/SR-A1A & 73rd St
1711	Miami-Dade	NB South Dixie Hwy/US-1 & SW 144th St
1712	Miami-Dade	EB SW 56 St & SW 87th Ave/SR-973
1713	Miami-Dade	NB SW 117 Ave & SW 40th St/SR-976
1714	Miami-Dade	WB SW 72nd St/Sunset Dr & SW 142nd Ave
1715	Miami-Dade	WB NW 122nd St/W 68 St & W 17 Ct
1716	Miami-Dade	SB US-441/SR-7 & NW 151st
1717	Miami-Dade	NB NW N River Dr & NW 4th St
1718	Miami-Dade	EB SW 216 St & SW 147th Ave
1719	Miami-Dade	SB NW 82 Ave & NW 25th St
1801	Orange	SB I-4/SR-400 & Lee Rd/SR-423 (Exit 88)
1802	Orange	WB East-West Expressway/SR-408 & E South St/SR-15 (Exit 11B)
1803	Orange	EB/NB I-4/SR-400 & Central Florida Parkway (Exit 71)
1804	Orange	NB Central FL Greenway/SR-417 & Lee Vista Blvd (Exit 27)
1805	Orange	NB S Semoran Blvd/SR-436 & Stonewall Jackson Rd
1806	Orange	NB John Young Pkwy/SR-423 & Americana Blvd
1807	Orange	NB John Young Pkwy/SR-423 & Crystal Creek Blvd/Menta St
1808	Orange	SB Orange Blossom Trail/US-441/US-17 & Skyview Dr/Southland Blvd
1809	Orange	WB Silver Star Rd/SR-438 & N Powers Dr
1810	Orange	EB Sandlake Rd/SR-482 & Mandarin Dr
1811	Orange	EB Hoffner Ave/SR-15/CR-506 & Conway Rd

1812	Orange	EB Conroy-Americana Rd/Conroy Rd & Cypress Woods Dr/Middlebrook Rd
1813	Orange	WB Beggs Rd & N Hiawassee Rd
1814	Orange	NB Fern Creek Ave & Michigan St
1815	Orange	SB Plymouth Sorrento Rd & Kelly Park Rd
1901	Palm Beach	NB I-95 & 10th Ave (Exit 64)
1902	Palm Beach	SB I-95 & W Palmetto Park Rd/SR-798 (Exit 44)
1903	Palm Beach	NB Florida's Turnpike & SR-806/W Atlantic Ave (Exit 81)
1904	Palm Beach	NB I-95/SR-9 & NW 22nd Ave (Exit 59)
1905	Palm Beach	EB Okeechobee Blvd/SR-704 & River Walk Blvd/Skees Rd
1906	Palm Beach	NB SR-7 & Fairgrounds Rd
1907	Palm Beach	WB West Atlantic Ave/SR-806 & High Point Blvd/Homewood Blvd
1908	Palm Beach	EB SR-808/SW 197th Ave/Glades Rd & Boca Grove Blvd
1909	Palm Beach	NB Old Dixie Hwy/SR-811 & SR-800/NE 40th St/Spanish River Blvd
1910	Palm Beach	EB W Forest Hill Blvd/SR-882 & Hunter Dr/Entrance to Mall
1911	Palm Beach	SB B Australian Ave/SR-704A & 1st St/Banyan Blvd
1912	Palm Beach	NB E Main St/US-441/SR-15 & SR-729/SR-15A
1913	Palm Beach	SB Parker Ave & Southern Blvd/US-98/SR-700
1914	Palm Beach	WB Southshore Blvd & Big Blue Trace
1915	Palm Beach	EB E Canal St S/SR-717 & SE Martin Luther King Blvd/SE Ave E
2001	Pinellas	NB I-275 & 54th Ave (Exit 26A)
2002	Pinellas	NB I-275/US-19 & Sunshine Skyway Ln (Exit 16)
2003	Pinellas	WB/SB I-275 & 28th St (Exit 21)
2004	Pinellas	SB McMullen Booth Rd/CR-611 & Sunset Point Rd/CR-576/Main St
2005	Pinellas	SB S Fort Harrison Ave/US-19 Alt & Lakeview Rd/CR-488
2006	Pinellas	NB Seminole Blvd/US-19 Alt/SR-595 & 98th Terrace N
2007	Pinellas	EB 1st Ave S & 64th St S
2008	Pinellas	NB Starkey Rd/CR-1 & East Bay Dr/SR-686
2009	Pinellas	SB Park St N/CR-1 & Tyrone Blvd/US-19 Alt/SR-595
2010	Pinellas	NB N Fort Harrison Ave/US-19 Alt & Drew St/SR-590
2011	Pinellas	WB Walsingham Rd/SR-688 & 137th St N
2012	Pinellas	NB 58th St S & 11th Ave
2101	Polk	EB I-4 & W Memorial Blvd/SR-546 (Exit 28)
2102	Polk	WB I-4 & Kathleen Rd/CR-35A (Exit 31)
2103	Polk	WB Van Fleet Dr/US-98/SR-35 & N Wilson Ave
2104	Polk	WB US-92/US-17 & US-17/SR-555
2105	Polk	NB US-17/US-98 & CR-640/Lake Hendry Rd
2106	Polk	SB S Florida Ave/SR-37 & Ariana St
2107	Polk	EB Lucerne Park Rd/SR-544 & Old Lucerne Park Rd
2108	Polk	SB SR-17/US-27 Alt/N Scenic Hwy & CR-17A/Burns Ave
2109	Polk	EB Overlook Dr/CR-550 & Carl Floyd Rd

APPENDIX B

Calculation of Variance

Let n_{ijk} be the number of sites of roadway stratum i in county j at which safety belt use is to be observed. Let O_{ijk} be the number of drivers and front outboard passengers observed at site k on roadway stratum i in county j. Of the vehicle occupants observed, B_{ijk} were using a safety belt. The rate of safety belt use at site k in stratum i of county j is estimated as:

$$P_{ijk} = \frac{B_{ijk}}{O_{ijk}}$$

The safety belt use rate stratum i in county j is estimated by:

$$P_{ij} = \sum_{k=1}^{n_{ij}} \frac{p_{ijk}}{n_{ij}}$$

because the probability of a site being included in the sample was proportional to its DVMT, averaging the use rates at the sites in a county/stratum makes use of the original probabilities to reflect their different DVMTs.

The stratum/county safety belt use rates are combined across strata within each county j, weighted by the roadway stratum's relative contribution to the total county DVMT.

$$P_j = \frac{\sum_{i=1}^{4} DVMT_{ij} P_{ij}}{\sum_{i=1}^{4} DVMT_{ij}}$$

The safetybelt use rates from the 12 counties are combined by weighting them by their relative contribution to the total 12 county DVMT and the inverse of their probability of selection Wj.

$$P = \frac{\sum_{j=1}^{12} DVMT_j W_j P_j}{\sum_{j=1}^{12} DVMT_j W_j}$$

where

$$W_j = \frac{\sum_{l=1}^{24} Pop_l}{12 Pop_j}$$

and pop_j is the population of county j.

Standard error of P was estimated using the jackknife approach based on the following equation:

$$\hat{\sigma}_{\hat{p}} = [\frac{n-1}{n} \sum_{i=1}^{n} (\hat{p}_i - \hat{p})^2]^{1/2}$$

where $\hat{\sigma}_p$ is the standard deviation of the estimated statewide safety belt use proportion p, and n is the number of sites (i.e., 151) and $\hat{p}_i$ is the estimated statewide safety belt use rate with site i excluded from the calculations.

The 95^{th} % confidence interval is calculated from P±1.96 $\hat{\sigma}_p$

APPENDIX C

PDA Data Collection Details

In the current study all data was collected using Personal Digital Assistants (PDAs). The biggest advantage to using PDA data collection instead of the more traditional paper-and-pencil method is the decrease in the time necessary to move from the end of the data collection phase of a survey to data analysis. With paper data, there is typically two to three weeks of additional time built-in while the paper data are being entered into an electronic format. In 2003, a pilot study was conducted to compare data collection by PDA to paper (Vivoda & Eby, 2006). Several key factors were tested including accuracy, volume (speed), ease of use, mechanical issues (e.g. battery life), and environmental issues (e.g., weather, daylight). The pilot study found PDA use to be equal to, or better than paper data collection on every factor tested.

Prior to beginning data collection, a new electronic data collection form was created specifically for the Florida survey. The form included new categories and upgraded the usability of the previous form. For each site surveyed, a separate copy of the form was created and copied to the observers' PDAs. When an observer arrived at each site, they would begin by opening the proper copy of the form, then entering descriptive information about the site such as the location, traffic control, date, etc. The observer was also provided with a place to sketch the site. Observers entered information by either typing it in (e.g., site location), or by tapping on the screen with the stylus (see Figure 2 for example site description screens).

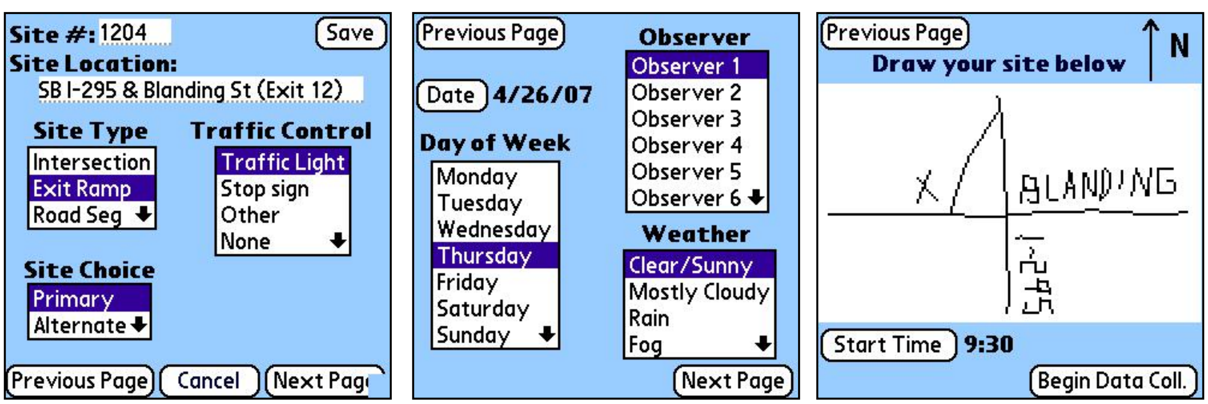

Figure 2. Site Description PDA Screens

Once the site description information was entered, observers began entering safety belt, demographic, and vehicle information using the observation screens in the file. This part of the data entry was divided into three screens, one for vehicle information, one for driver information, and one for front-right passenger information. As shown in Figure 3, each screen is accessible by tapping on the appropriate tab along the top of the screen. For each new vehicle, the first screen that appears on the PDA screen is the vehicle tab. Each category of data, along with the choices for each category are displayed on the screen. When an observer taps the appropriate category, it becomes highlighted on the screen. After entering vehicle information, the user taps the driver tab, enters those data, then taps the passenger tab and enters the passenger data. When the information for a given vehicle is complete, the user taps the "Next Vehicle" button to continue.

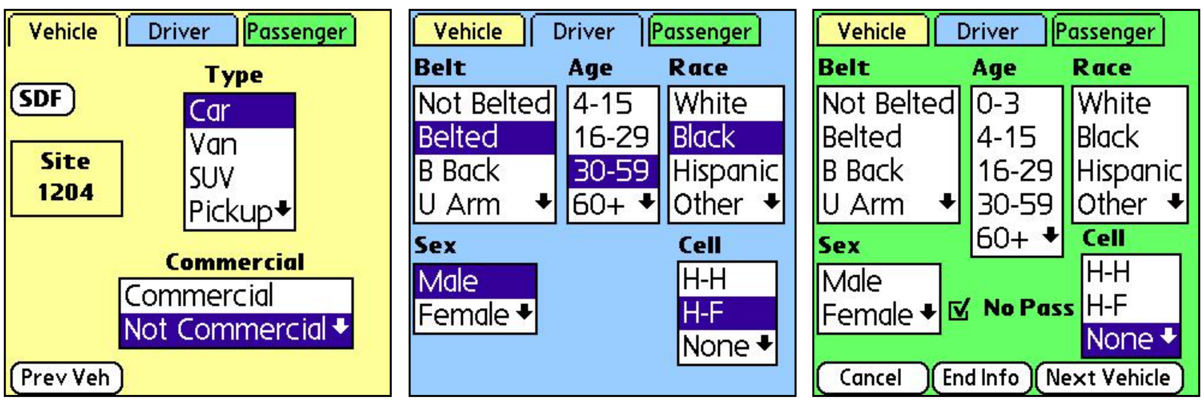

Figure 3. Observation PDA Screens

The PDAs also had built-in cellular phone and wireless e-mail capability. At regular intervals, usually once per day, observers e-mailed completed data directly from the PDA to the project supervisor. All of the electronic files for the day were "zipped," using a compression program, and then transmitted directly to a pre-determined e-mail account. The e-mailing of data allowed the field supervisor to immediately check data for errors, and begin to compile a data analysis file as the project progressed.