November 1983
Final Report

DOT HS-806-522

EXPERIMENTAL FIELD TEST OF PROPOSED PEDESTRIAN SAFETY MESSAGES

US Department of Transportation
National Highway Traffic Safety Administration

VOLUME II
CHILD MESSAGES

RICHARD D. BLOMBERG
DAVID F. PREUSSER
ALLEN HALE
WILLIAM A. LEAF

DUNLAP AND ASSOCIATES EAST, INC.
17 WASHINGTON STREET
NORWALK, CONNECTICUT 06854

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16. Abstract

A detailed re-analysis of available pedestrian accident data was utilized to define three sets of pedestrian safety public information and education (PI&E) messages. These messages were then produced and field tested. The objectives and theoretical background for the study are addressed in Volume I. The messages directed at child pedestrian accidents and using an animated character named "Willy Whistle" are covered in this Volume. Two sets of adult-oriented messages are the focus of Volume III. The child messages were successful in reducing pedestrian accidents in three test cities. The adult messages also yielded some positive results. It was concluded that these messages are viable pedestrian accident countermeasures. The success of these messages leads to the additional conclusion that PI&E, in general, can be an effective countermeasure modality for modifying simple behaviors if adequate exposure is obtained.

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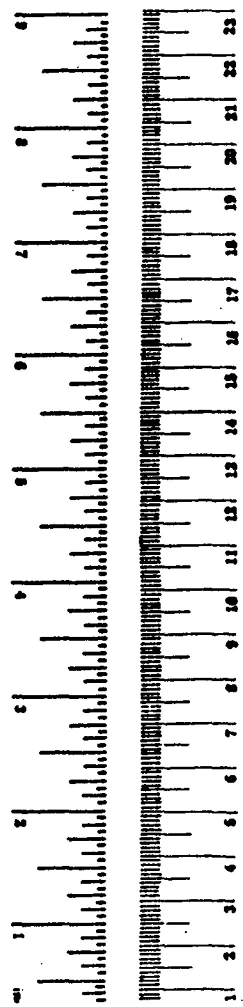
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

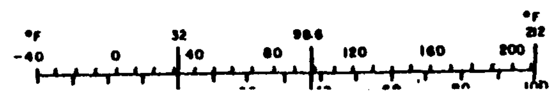
Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in ≡ 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

TECHNICAL SUMMARY

CONTRACTOR	Dunlap and Associates East, Inc. 17 Washington Street Norwalk CT 06854	CONTRACT NUMBER	DOT-HS-4-00952
REPORT TITLE	Experimental Field Test of Proposed Pedestrian Safety Messages (3 Volumes)	REPORT DATE	November 1983
REPORT AUTHOR(S)	Richard D. Blomberg, David F. Preusser, Allen Hale, William A. Leaf		

The overall objective of the project reported herein was to utilize the pedestrian accident data collected and analyzed on a previous NHTSA study (Snyder and Knoblauch, 1971) to structure the content, presentation and evaluation of public education messages designed to reduce specific types of pedestrian accidents. A predecessor study (Blomberg and Preusser, 1975) had shown that members of the population at risk for various accident types would adopt safer street crossing behaviors if these behaviors were simple and convenient and if the target audience understood the need for these safer behaviors. It was the task of the present effort to extend these findings to "real world" situations by actually executing the specific behavioral advice in a form suitable for mass media presentation, distributing the produced messages in test markets and assessing the results of the process.

In order to guide both the message development and the assessment activities, a model of the process by which public education produces an accident reduction was developed and followed. This model involves seven sequential steps beginning with knowledge of the problem and proceeding through development of a message content, media production, transmission, changes in knowledge or attitudes and behavioral change to the achievement of accident reduction. To accomplish the steps of the model with minimum losses between steps, this project utilized a multi-disciplinary team of researchers, advertising specialists and media producers, all of whom were guided by the in-depth accident data of Snyder and Knoblauch (1971).

By grouping accident cases with similar precipitating and predisposing factors, Snyder and Knoblauch (1971) were able to define and name over 30 specific accident types. Since these types were defined as involving specific behavioral errors on the part of drivers and pedestrians, it seemed reasonable and potentially effective to attempt to combat specific pedestrian accident types by altering their identified unsafe behaviors. It was also reasoned that the accident types themselves described situations, e.g., crossing in front of a car which had stopped to allow the pedestrian to cross, with which the population at risk could relate and during which they might be convinced to substitute safer behaviors or omit unsafe actions.

The accident types with the greatest frequency of occurrence appeared to be the logical candidates from which to choose initial countermeasure targets. The types selected as targets for this study from among the types with the greatest frequency were:

(Continue on additional pages)

"PREPARED FOR THE DEPARTMENT OF TRANSPORTATION, NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION UNDER CONTRACT NO.: DOT-HS-4-00952. THE OPINIONS, FINDINGS, AND CONCLUSIONS EXPRESSED IN THIS PUBLICATION ARE THOSE OF THE AUTHORS AND NOT NECESSARILY THOSE OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION."

HS Form 321
July 1974

- Dart-Out, First Half--in which the pedestrian, typically a child aged nine or less, is struck in the first half of a non-intersection (midblock) crossing and in which there was a short time exposure, i.e., the driver and pedestrian had insufficient preview time of each other to avoid an accident.

- Dart-Out, Second Half--same as Dart-Out, First Half except the pedestrian was struck in the second half of the roadway being crossed.

- Vehicle Turn-Merge with Attention Conflict (VTM)--in which the driver is making a turn, is distracted by factors other than the pedestrian and strikes the pedestrian who generally assumes he or she has been seen and will be yielded to. The pedestrian is typically an adult.

- Multiple Threat (MT)--which involves a pedestrian, usually an adult, crossing in front of a vehicle (which has yielded to him or her) being struck by an overtaking vehicle whose driver's vision was blocked by the stopped car.

Dart-Outs represent about 39% of all pedestrian accidents. VTM crashes account for about another 13% and Multiple Threats, though highly variable in incidence from city-to-city, can account for up to 10% of a locale's pedestrian crashes.

The great differences between adult and child media consumption patterns, learning abilities and types of pedestrian accident involvements as well as the somewhat different measurement techniques used for the assessment of the child and adult materials suggest the need to separate the discussions devoted to children and adults. Hence, this summary will focus first upon the details of the field test of the materials directed to children and then on the details of the assessment of adult materials.

Child Messages

The child anti-Dart-Out messages, which included a 6-7 minute classroom film, three 30 second and three 60 second TV spots and a poster, all employed an original animated character named "Willy Whistle" as the spokesperson. The six TV spots covered each of the behavioral messages contained in the classroom film.

The three 60 second spots covered:

- "The Whole Story"--stopping at the curb and looking left-right-left (L-R-L) before crossing; stopping at the edge of a parked car and looking L-R-L before crossing; and reinitiation, i.e., beginning the L-R-L all over again if interrupted.

- "Reinitiation"--beginning the stop and L-R-L sequence all over again if interrupted so that you obtain a "clean" L-R-L before crossing.

- "Curbs and Parked Cars"--the stop (at the curb or edge of the parked car) and look L-R-L message with particular emphasis on the stop part of the advice.

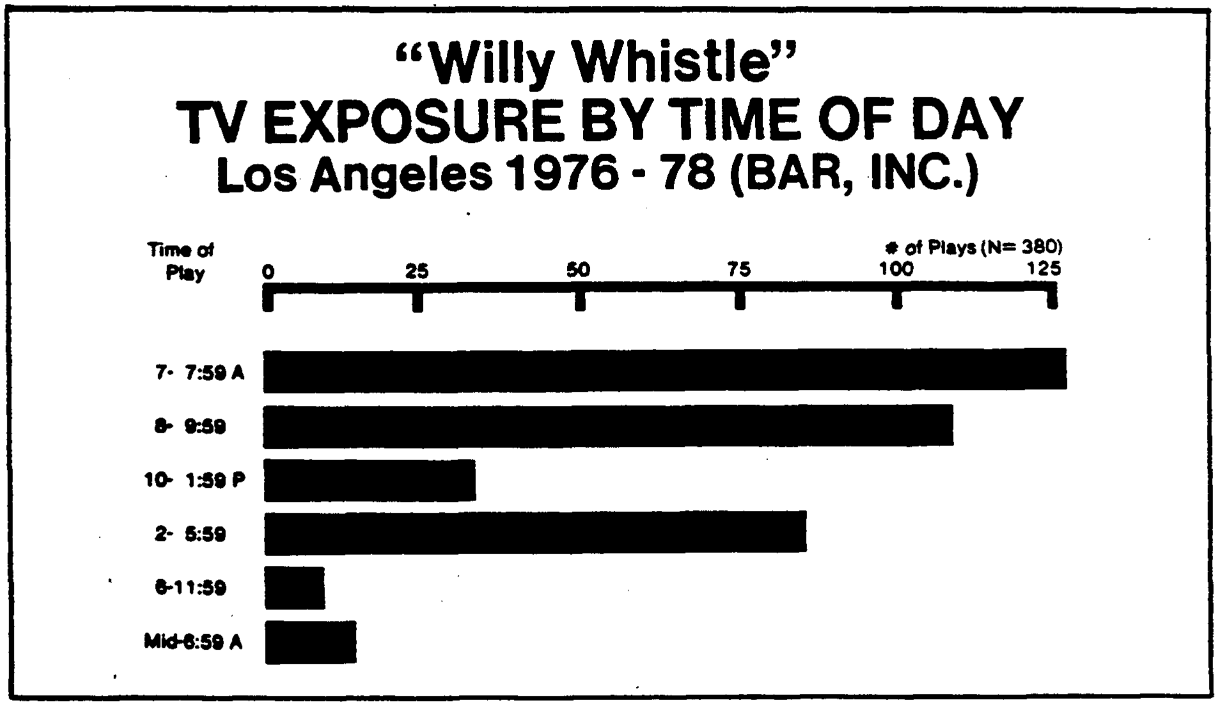
The three 30 second spots were essentially abbreviated versions of the 60 second materials and were titled:

- "Search"
- "Curbs"
- "Parked Cars"

<u>Field Test of Child Materials</u>

A field test was undertaken to determine if the Willy Whistle messages were effective countermeasures for Dart-Out accidents among young children. The materials were distributed to television stations and schools in Los Angeles, California, Columbus, Ohio and Milwaukee, Wisconsin during 1976 and 1977. Pedestrian accidents were examined in detail for at least three years prior to introducing the materials and for two years after their introduction. In addition, as a means of learning more about the process by which Willy Whistle might impact pedestrian accidents, careful measures were taken of: the exposure of the children in each city to the TV and classroom materials; recall of the materials and their contents by the children; safe street crossing knowledge; and actual street crossing behavior. Each of these measures was taken at least three times in each city--before distribution of Willy Whistle, several months after distribution and at the end of the study period.

The results of all the measures were highly encouraging. Exposure, whether through TV (380 plays valued at $150,000 in Los Angeles alone) or in the classroom (at least 113,000 children in Los Angeles saw the film), appeared good. It was particularly noteworthy that the television stations seemed to play the Willy Whistle materials at particularly opportune or "prime" times for the target age group. For example, the Figure below shows the distribution of plays by time of day for Willy Whistle in Los Angeles, the only one of the test cities for which full time monitoring was available through Broadcast Advertisers Reports, Inc.,



(BAR). The vast majority of the plays were logged in the morning and after school hours when children typically watch TV. Relatively few plays were received in the post-midnight time period which is the traditional "graveyard" for public service announcements. Anecdotal reports from TV station public service directors indicated that they played Willy more than most other PSAs because they liked the quality of the material and because there was very limited competition for public service time during the hours when children were the primary audience.

An in-school survey was conducted to assess changes in child knowledge of safe street crossing practices and to examine recall of the Willy Whistle messages. The survey in each test city showed that over 70 percent of the school children in kindergarten through sixth grade knew who Willy Whistle was after the materials had been available for approximately one year. Their expressed knowledge of safe street crossing behaviors also increased dramatically as shown in the Table below. This Table shows the percent of child respondents who gave the correct answers for: search at the curb (L-R-L); course at the curb (stop at the curb); search near parked cars (L-R-L); course near parked cars (stop at the outside edge of the parked car); and reinitiation (let car pass and look L-R-L until no cars are coming). It is interesting to notice that the largest knowledge gains were for the more novel parts of the behavioral sequence. A left-right-left search pattern, advice on crossing near parked cars and reinitiation were topics that had not typically been covered in the major pedestrian safety materials available prior to Willy Whistle.

CHILD
PERCENT CORRECT KNOWLEDGE

	Los Angeles		Columbus		Milwaukee	
	Pre	Post	Pre	Post	Pre	Post
N=	357	301	329	293	453	423
Search - Curb	11%	44%	3%	42%	6%	61%
Course - Curb	3	3	4	10	7	18
Search - Parked Cars	5	41	2	38	4	57
Course - Parked Cars	8	41	20	76	4	60
Reinitiation	6	37	2	28	2	36

The actual street crossing behavior of elementary school students was also measured in the three test cities. In order to amass a sufficient sample of observed crossings, children were viewed after school dismissals as they dispersed for home and in the neighborhoods immediately surrounding the school. These were not the typical conditions for occurrence of Dart-Out accidents, but there was no other reasonable means of obtaining a large sample of observed crossings. Therefore, the results of the behavior observations shown below likely understate correct behaviors. Children in groups or under the protective umbrella of the trip home from school may be expected to feel safer than when they are alone. This could easily result in poorer street crossing behavior due to a reliance on "external" protection.

CHILD
PERCENT CORRECT BEHAVIOR

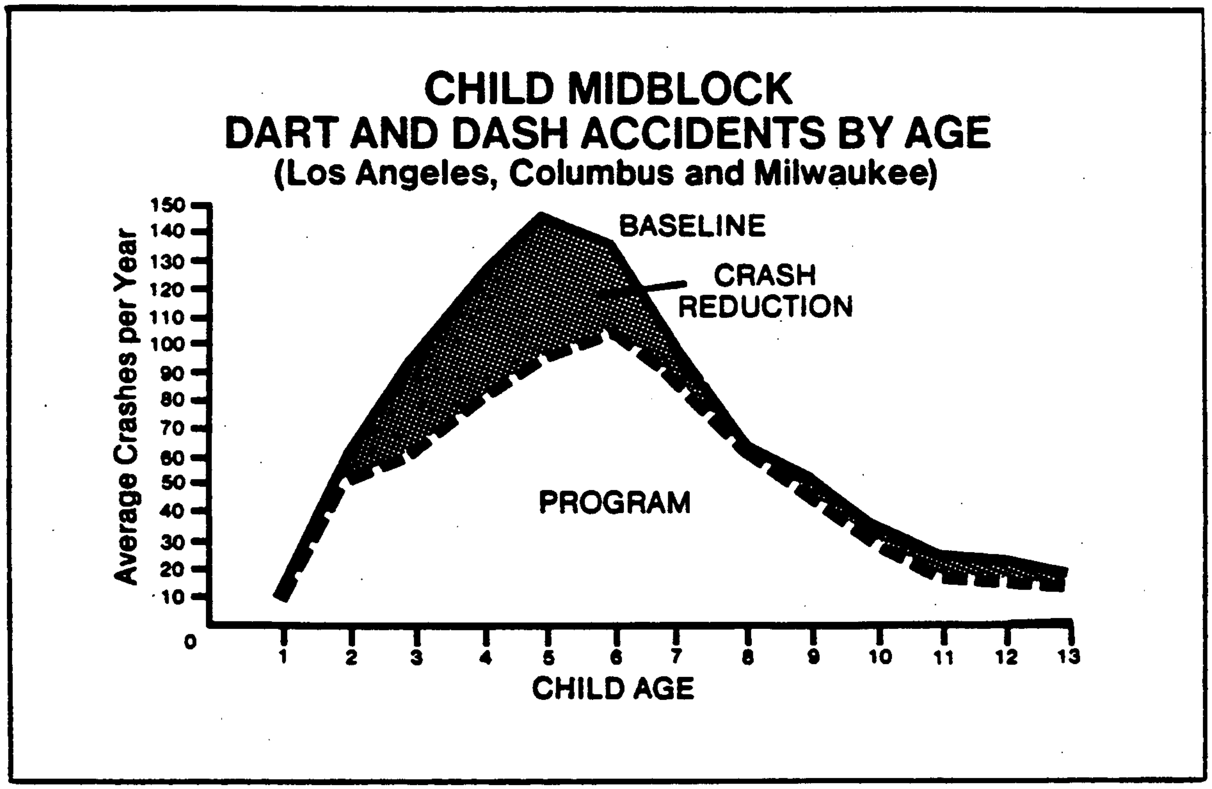
	Los Angeles		Columbus		Milwaukee	
	Pre	Post	Pre	Post	Pre	Post
N=	4096	5692	1148	1126	3502	2261
Search (L-R-L)	5%	11%	5%	7%	3%	9%
Course (Full Stop)	20	16	15	12	12	17

The behavioral data show a statistically significant improvement in L-R-L search in each of the three test cities. Totally correct stopping behavior showed an improvement in Milwaukee and a slight decline in the other two cities. Overall, however, it could be concluded that, within the measurement sensitivity of behavioral observations using human observers, the general trend was toward better behaviors. It must, nevertheless, be noted that the measured child behaviors in the after school hours either before or after introduction of Willy Whistle were quite poor.

The ultimate measure of the effectiveness of the Willy Whistle messages in the three test cities was their impact on Dart-Out accidents. In each city, every police pedestrian accident report for a baseline period of at least three years and for the Willy Whistle program years was obtained, read and assigned an accident type. In each city, a significant reduction of Dart-Out accidents was observed. Across the three cities, Dart-Outs involving pedestrians 14 years of age and under declined by an average of over 20 percent. This relates to about a 12 percent reduction in all pedestrian crashes involving this age group. There was a statistically significant drop in child Dart-Out accidents in each of the three cities when measured using time series techniques. The crash reduction results were not, however, uniformly distributed by age.

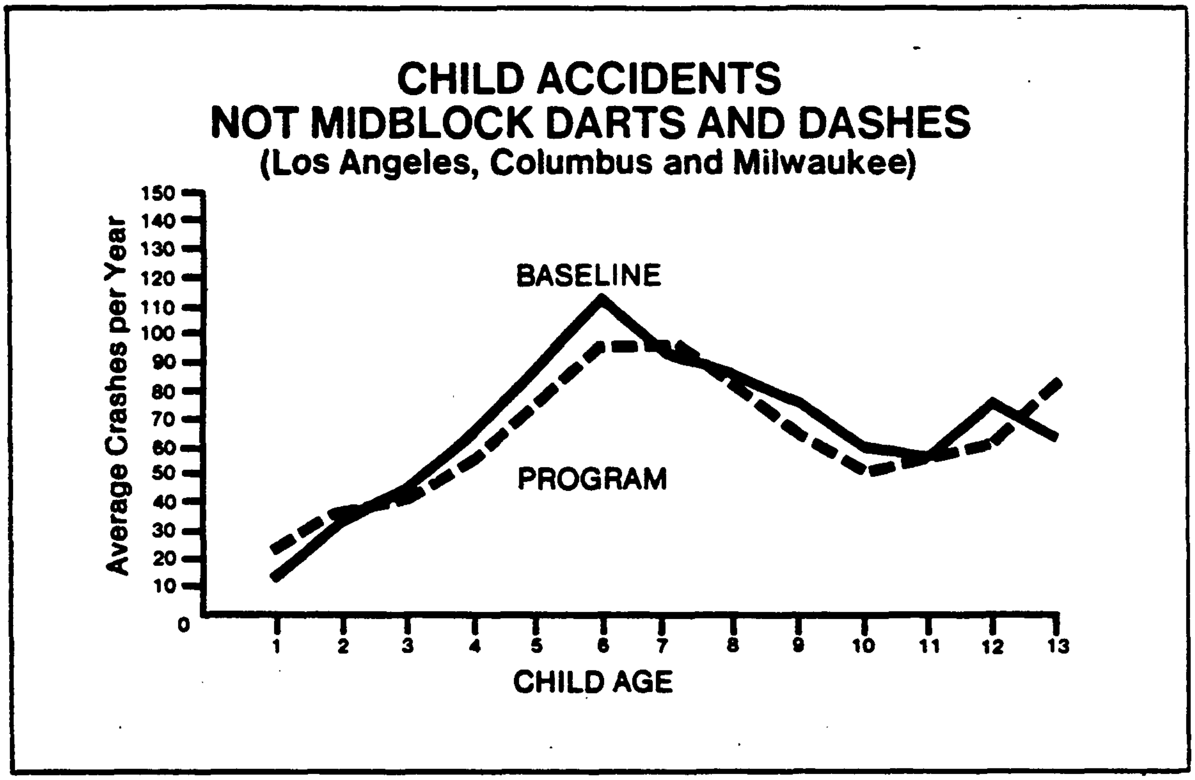
The Figure below shows the distribution of the average annual number of Dart-Out accidents by age for the three test cities combined, separated into the baseline and program periods. From this Figure, one can clearly observe that the great majority of the crash reduction took place among four to six year olds.

Overall, Dart-Outs for four, five and six year olds declined over 30 percent from the baseline to the program period. This large impact of Willy in the pre-school years strongly suggests that television exposure to this audience was effective as they were not exposed to the classroom materials.



In order to place the accident reduction results in perspective, it is interesting to examine what happened to accidents other than midblock Dart-Outs during the same period when the decline in Dart-Outs was observed. Shown below is a plot similar to the one presented above but for all accidents which were not of the midblock Dart-Out types. The shape of the baseline and program curves presented below show a striking similarity suggesting that the decline in Dart-Outs was likely not the result of a general trend toward lower child pedestrian accidents in the test cities.

Another way to look at the effectiveness of the Willy Whistle messages is in terms of crashes reduced or avoided. The time series analysis projected that 48, 96 and 150 pedestrian accidents to children between the ages of three and eight did not occur in Columbus, Milwaukee and Los Angeles, respectively, during the two year test period because of the introduction of Willy Whistle. If each of these crashes would have entailed an average cost to society of $10,000 (a sum which is not unreasonable for an injury accident involving a youth), Willy Whistle saved society almost $3 million while it was being tested. Thus, the child message package produced for this study was proved to be both an effective and a cost-effective pedestrian accident countermeasure.



Adult Messages

Each adult accident type (VTM and MT) was addressed with two 60 second and two 30 second TV spots and 60 and 30 second radio spots. The VTM messages included:

- 60 and 30 second TV and radio spots addressed to drivers to remind them to take a last look for pedestrians before making turns at intersections ("search" message). Both right and left turns are depicted and the heavy demands on the driver in a turning situation are discussed (i.e., "all the things a driver has to watch out for").

- 60 and 30 second TV spots addressed to pedestrians telling them that drivers making turns have a lot to watch out for and may sometimes forget to look for pedestrians. Specifically, the spots give a "search" message and tell pedestrians to "look at the driver not just the car" in an effort to overcome the erroneous assumption on the part of the pedestrian that he or she has been seen and will be permitted to cross.

The VTM materials were also produced in a Spanish language version to meet the market needs in the test cities and to provide insights into the potential benefits of multi-lingual production.

The Multiple Threat package was similar in construction to the VTM messages except that only an English language version was produced. The specific materials included:

- 60 and 30 second TV and radio spots to drivers telling them to look ("search") for cars stopped in travelled lanes, slow down ("course" message) and ask themselves why the car was stopped. The audience is then told and/or shown that the stopped car could be hiding a pedestrian.

- 60 and 30 second pedestrian-oriented spots presented the messages to stop at the edge of any car that stops to allow a crossing ("course" message) and to look around it for any cars coming in the next lane ("search" message).

Field Test of Adult Messages

The VTM messages were tested in both Los Angeles and San Diego, California. The MT messages were tested only in Los Angeles. For both sets of messages, the years 1973, 1974 and 1975 constituted the accident baseline. Messages were distributed early in 1976 and were actively promoted for two years. Thus, 1976 and 1977 were established as the "program" years during which accident reduction, if achieved, would have been observed. As in the test of the Willy Whistle messages, exposure, recall, knowledge and behavior data were collected in each city as intermediate measures of program effectiveness.

Television exposure was measured by BAR in Los Angeles and through direct access to station logs in San Diego. These data showed that the adult messages received significantly fewer plays than did Willy Whistle. For example, the MT messages in Los Angeles were logged only 58 times by BAR in 1976 and 1977, and the VTM spots were tallied only 43 times during the same period. Follow-up discussions with the station public affairs directors indicated that the primary reason for the relatively smaller exposure of the adult materials was the intense competition for free (public service) advertising directed at adults. In fact, the stations in Los Angeles mentioned that the VTM and MT messages competed with each other, thereby suppressing the exposure of the individual messages.

In addition to measuring exposure through post hoc monitoring, it was useful to examine actual audience unaided recall of the messages. This provided data for segments of the population, e.g., Spanish speaking families, which could not be obtained from monitoring reports. Unaided recall was measured using open-ended questions on a telephone survey conducted in both English and Spanish. The resulting data, as summarized below, showed significantly higher recall among Spanish-speaking residents of the test sites than among those whose primary language was English. The difference was particularly noteworthy for the VTM messages in Los Angeles where there was little (3% maximum) recall of the messages among the English-speaking survey sample but significant recall among Spanish language respondents (38%).

MAXIMUM PERCENT SPECIFIC RECALL OF ADULT MESSAGES (TV OR RADIO)

		Los Angeles	San Diego
VTM	ENGLISH	3%	24%
	SPANISH	38%	28%
MT	ENGLISH	4%	N/A
	SPANISH	8%	N/A

As part of the same telephone survey which measured recall, the respondent's knowledge of the correct way to behave in VTM and MT situations was assessed. The results for knowledge of what a pedestrian should do in the VTM and MT situations are shown in the table below.

ADULT PERCENT CORRECT PEDESTRIAN KNOWLEDGE

		Los Angeles		San Diego	
		PRE	POST	PRE	POST
	N=	658	657	548	564
VTM	SEARCH	4%	7%	1%	9%
MT	SEARCH	18%	30%	14%	25%
	COURSE	9%	16%	11%	9%

These data, presented as a percent of the respondents giving the correct information, generally show an improvement in pedestrian knowledge. Detailed analyses of the survey data indicated that much of the observed improvement came from the Spanish language sample.

The knowledge of correct driver actions in the VTM and MT situations was measured with survey questions directed only to the licensed drivers in the survey sample. Slight improvements were observed in San Diego, but Los Angeles respondents showed no significant improvements. The data are summarized below.

ADULT
PERCENT CORRECT
DRIVER KNOWLEDGE

		Los Angeles PRE	Los Angeles POST	San Diego PRE	San Diego POST
	N=	508	542	452	468
VTM	SEARCH	27%	28%	21%	31%
MT	SEARCH	21%	14%	7%	14%
	COURSE	80%	75%	78%	79%

Observations of pedestrian and driver behaviors in the VTM and MT situations were collected. Correct pedestrian behavior improved as shown in the Table below. In the VTM situation, there was a significant improvement in both Los Angeles and San Diego. This improvement was most pronounced if a turning vehicle was present but also was observed in the absence of a vehicular threat. Multiple Threat observations, which were only taken in Los Angeles, showed increases in both correct search ("Look around a car that stops for you") and course ("Stop at the outside edge of a car that stops for you") behavior.

ADULT PERCENT CORRECT PEDESTRIAN BEHAVIOR

		Los Angeles PRE	Los Angeles POST	San Diego PRE	San Diego POST
VTM SEARCH					
	VEHICLE PRESENT	8% (3,076)	20% (2,186)	9% (812)	26% (1,289)
	VEHICLE ABSENT	3 (3,244)	10 (2,329)	10 (1,438)	20 (1,225)
MT					
	SEARCH	73 (2,653)	80 (3,113)	N/A	
	COURSE	13 (2,661)	41 (3,113)	N/A	

Measurement of driver behavior was also undertaken in both the VTM and MT situations. Unfortunately observation of driver search patterns through tinted windshields, sun glare, etc., in the VTM situation, proved extremely difficult and unreliable. Also, inter- and intra-rater reliability of the slowing behavior of motorists in the MT situation proved to be poor. These measurement problems are considered to be the reason for the equivocal and even negative driver behavioral results summarized below.

ADULT PERCENT CORRECT DRIVER BEHAVIOR

	Los Angeles PRE	Los Angeles POST	San Diego PRE	San Diego POST
VTM - SEARCH				
LEFT TURNING	41% (1,802)	42% (1,943)	48% (1,395)	36% (1,533)
RIGHT TURNING	46 (2,931)	43 (2,682)	59 (2,000)	49 (2,463)
MT - COURSE	74 (1,951)	61 (2,658)	N/A	
(N)				

Accident data for the VTM and MT types in Los Angeles and VTM accidents in San Diego were analyzed using time series techniques. No significant decrease in either type was detected. The percent of the relevant types by year and the total numbers of all pedestrian accidents by year in each city are shown below.

PERCENT
VTM AND MT ACCIDENTS

LOS ANGELES

	1973	1974	1975	1976 (PROGRAM)	1977 (PROGRAM)	1978
N ALL ACC. TYPES	3062	3082	3141	3310	3239	3549
VTM	14.0%	13.0%	13.4%	13.7%	13.2%	15.2%
MT	6.6	6.8	7.0	7.4	6.9	7.7

No change by Time Series

SAN DIEGO

	1973	1974	1975	1976 (PROGRAM)	1977 (PROGRAM)	1978
N ALL ACC. TYPES	531	514	512	545	539	622
VTM	11.5%	15.0%	12.1%	12.1%	16.0%	19.0%

Even though no overall decrease in VTM accidents was observed, the relatively high recall and knowledge measured among Spanish-speaking residents of the test cities suggested the need to examine separately accidents among this group. Fortunately, data coded on the Los Angeles police accident report (but not coded in San Diego) made such an analysis possible. The resulting time series of VTM accidents involving either a Spanish-speaking pedestrian (10 years or older) or driver, as shown below, yielded a statistically significant accident reduction. The analysis indicated that VTM accidents to this group declined by 18 percent or about 24 crashes per year during the program years when the developed messages were being aired.

PERCENT VTM ACCIDENTS SPANISH PEDESTRIAN (10+ YEARS OLD) OR DRIVER

LOS ANGELES	1973	1974	1975	1976 (PROGRAM)	1977 (PROGRAM)	1978
N ALL TYPES	663	684	712	760	758	960
VTM	18%	19%	17%	15%	14%	17%

−18% (~ 24 per year) BY TIME SERIES

Conclusions

The success of the Willy Whistle and Spanish VTM messages leads to the specific conclusion that they are effective. The demonstrated benefits of these messages also leads to the conclusion that public information and education (PI&E) can be a viable countermeasure. The overall pattern of results suggests that message effectiveness increases with increased exposure. Thus, for example, the Willy Whistle campaign benefitted from having both a classroom and a TV component. Achieving sufficient exposure for PI&E materials is, however, difficult, especially for adult audiences. Personal contacts with stations, multi-lingual messages and local sponsorship are some of the ways in which additional air time may be secured.

In addition to proving the effectiveness of the modality and the specific countermeasures, this study also developed and validated a process for PI&E generation which coupled research, advertising and media development skills with detailed accident data serving as the cohesive force. The demonstrated success of this process leads to the conclusion that it should be given serious consideration whenever PI&E countermeasures are to be produced.

FOREWORD

This report is the second volume of the Final Report of Contract No. DOT-HS-4-00952 between the U.S. Department of Transportation, National Highway Traffic Safety Administration and Dunlap and Associates East, Inc. (formerly the Eastern Division of Dunlap and Associates, Inc.). The objectives of the study were to produce and field test public education messages designed to reduce pedestrian accidents.

This volume is devoted to a description of the field test of the messages directed to child audiences. Volume I describes the theory behind the development of the messages and details the development processes. Volume III presents the methods and results of the field test of the messages directed to adults.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

LIST OF TABLES AND FIGURES
(Continued)

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Among all of the individuals who provided support for field test operations in the three test cities (Los Angeles, CA; Milwaukee, WI; and Columbus, OH), the following (listed alphabetically) are singled out for our particular thanks:

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  Project Coordinator in Los Angeles
- Neal J. Rathjen
  Milwaukee Public Schools
- Donald W. Rector
  School Safety Supervisor, Los Angeles Unified School District
- Henry Wantoch
  Executive Director, Milwaukee Safety Commission

I. INTRODUCTION

Pedestrian accidents are a major cause of death and injury to young children. The 1977 edition of Accident Facts (National Safety Council) indicates that the number of deaths due to pedestrian accidents among children under 14 ranked second with only accidents in which the children were passengers in motor vehicles being more numerous. The high frequency of pedestrian accidents to young children suggested the need for countermeasures designed to reduce the problem. Therefore, a major part of the effort in the "Experimental Field Test of Proposed Pedestrian Safety Messages," performed by Dunlap and Associates East, Inc., for the U.S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA), was devoted to the production and test of public education materials for children.

The overall objective of the project reported herein was to utilize the accident data collected and analyzed on a previous NHTSA study (Snyder and Knoblauch, 1971) to structure the content, presentation and evaluation of public education messages designed to reduce specific types of child and adult pedestrian accidents. A predecessor study (Blomberg and Preusser, 1975) had shown that members of the population at risk for various accident types could be convinced to alter their behavior if presented with an appropriate message in a controlled environment. It was the task of the present effort to extend these findings to "real world" situations by actually executing the specific behavioral advice in a form suitable for mass media presentation, distributing the produced messages in test markets and assessing the results of the process.

The detailed theoretical background to the development and testing of pedestrian safety messages utilized in this study is presented in Volume I of this report. A model of public education as a safety countermeasure was developed to guide both the message development and field test activities. Underlying the entire effort was the conscious desire to remain faithful to the pedestrian accident type concept developed by Snyder and Knoblauch (1971). In their examination of pedestrian accident causation, these researchers adopted a behavioral view of accident occurrence. Simply, both parties to the accident, the driver and the pedestrian, had to commit (or suffer from since there is no requirement for conscious action) a behavioral "error" or "failure" in order for a pedestrian accident to occur. These failures were termed "precipitating factors" in the Snyder and Knoblauch (1971) research. Further, there are conditions (termed "predisposing factors") e.g., in the environment, weather or lighting, or in the condition of the parties, e.g., fatigue or intoxication, or in the vehicle, e.g., a mechanical malfunction, which can make a precipitating factor more likely to occur.

By grouping accident cases with similar precipitating and predisposing factors, Snyder and Knoblauch (1971) were able to define and name over 30 specific accident types. Since these types were defined as involving specific behavioral errors on the part of drivers and pedestrians, it seemed totally logical and potentially effective to attempt to combat pedestrian accidents by altering the identified unsafe behaviors in particular accident types. It was reasoned that the accident types themselves described situations, e.g., crossing near a parked car, with which the population at risk could relate and during which they might be convinced to substitute safer behaviors or omit unsafe actions.

The accident types with the greatest frequency of occurrence appeared to be the logical candidates from which to choose initial countermeasure targets. Among the types with the greatest frequency were:

- o Dart-Out, First Half--in which the pedestrian is struck in the first half of the non-intersection (midblock) crossing and in which there was a short time exposure, i.e., the driver and pedestrian had insufficient preview time of each other to avoid an accident.

- o Dart-Out, Second Half--same as Dart-Out, First Half except the pedestrian was struck in the second half of the roadway being crossed.

- o Vehicle Turn-Merge with Attention Conflict (VTM)--in which the driver is making a turn, is distracted by factors other than the pedestrian, and strikes the pedestrian who generally assumes he or she has been seen and will be yielded to.

- o Multiple Threat (MT)--which involves a pedestrian crossing in front of a vehicle (which has yielded to him or her) being struck by an overtaking vehicle whose driver's vision was blocked by the stopped car.

These were selected as the countermeasure targets for the study.

Pedestrians involved in the Dart-Out accident types tend to be quite young. Data presented later in this volume show that well over half of the pedestrian accidents to people 9 years old or younger are Dart-Outs. Further, the data collected by Snyder and Knoblauch (1971) show that well over 70% of all Dart-Outs involved children 9 or younger. Hence, it is reasonable to regard Dart-Outs as primarily a problem among children.

The VTM and Multiple Threat accidents, on the other hand, are predominantly an adult problem. Snyder and Knoblauch (1971) showed that only about 20% of Multiple Threats involved pedestrians 9 or younger, and less than 10% of the VTMs in their data base involved a pedestrian under 16 years old. Thus, the VTM and Multiple Threat problems could realistically be viewed as an "adult" problem.

The great differences between adult and child media consumption patterns, learning abilities and types of pedestrian accident involvements as well as the different measurement techniques used for the assessment of the child and adult materials suggested the separation of the report presentations devoted to children and adults. Hence, the balance of this report volume focuses only upon the details of the field test of the materials directed to children. These messages, which included a 6 minute "long" film, three 30 second and three 60 second TV spots and a poster, all employed an original animated character named "Willy Whistle" as the spokesperson.

The six TV spots covered each of the behavioral messages contained in the long film. For reasons discussed in the next chapter, two versions of the TV spots (one at a midblock location and one at an intersection location) and three versions of the long film (midblock, midblock with special introduction and intersection) were actually prepared and used. The actual message content, however, did not vary significantly across versions.

The three 60 second spots covered:

- "The Whole Story"--stopping at the curb and looking left-right-left (L-R-L) before crossing; stopping at the edge of a parked car and looking L-R-L before crossing; and reinitiation, i.e., beginning the L-R-L all over again if interrupted.

- "Reinitiation"--beginning the stop and L-R-L sequence all over again if interrupted so that you obtain a "clean" L-R-L before crossing.

- "Curbs and Parked Cars"--the stop (at the curb or edge of the parked car) and look L-R-L message with particular emphasis on the stop part of the advice.

The three 30 second spots were essentially abbreviated versions of the 60 second materials and were titled:

- "Search"
- "Curbs"
- "Parked Cars"

Appendix A contains "photoboards" of the six TV spots. These spots,taken together, provide a complete description of the instructional content of the 6 minute "long film" from which the spots were taken. In actual distribution, the long film was accompanied by a two-page flyer describing the firm and suggested review questions for the teacher. Copies of these flyers for the three film versions are also contained in Appendix A.

The Willy Whistle materials were field tested in Los Angeles, California, Columbus, Ohio and Milwaukee, Wisconsin utilizing a pre/post experimental design. Pedestrian crashes of the Dart-Out types were the primary criterion measure employed. In addition, statewide accident data were accessed for California, Ohio and Wisconsin to examine accidents in other areas of these states not exposed to the Willy Whistle countermeasures. Intermediate measures of effectiveness, including exposure of the messages, knowledge changes and behavioral changes, were also collected in each test city.

The remaining chapters of this volume address the distribution of the materials (Chapter II), results of the assessment of knowledge changes (Chapter III), behavioral change findings (Chapter IV), accident impact analyses (Chapter V) and conclusions (Chapter VI). Volume I of this Final report addresses the process by which the messages, both for children and adults, were conceived and executed. Volume III, which is structured similarly to this volume, discusses the adult message test results.

II. SITE SELECTION, MESSAGE DISTRIBUTION AND MESSAGE EXPOSURE

This chapter discusses how the experimental sites were selected, the procedures and techniques utilized to distribute the materials and the amount of air time, in-school exposure, etc., that the materials achieved. As referenced above, the test of the child messages was part of a larger study to test messages targeted for both children and adults. In two of the test cities (Milwaukee and Columbus) only the child materials were shown, thus there could be no effects from the adult messages on child knowledge, behavior or accidents. In the remaining test city (Los Angeles), the adult messages were distributed and thus could have influenced the children or their accident experience. However, it is not felt that the adult messages had any significant or otherwise noteworthy influence on the child dart and dash accident situation. The adult messages were targeted towards different accident situations and received far less exposure in Los Angeles, when compared to the exposure achieved with the child materials. Thus, while the test in Los Angeles was different due to the presence of the adult messages, this difference probably did not materially influence the results presented in this and succeeding chapters.

A. Site Selection

Initial planning for this project called for two cities to serve as test sites for the child messages. One of these cities (initially Columbus, Ohio) would receive only the child messages while the other (Los Angeles) would receive all of the developed materials including the adult television and radio spots. It was felt that one city (Columbus) would serve as a "pure" test of the child dart and dash materials while the other (Los Angeles) would test both the direct effects of the child materials plus any synergistic effects that might arise from having all of the materials in one city. The basic site selection criteria applied to both Los Angeles and Columbus were as follows:

- Be able to provide pedestrian accident data in sufficient detail to permit a determination of accident type.
- Have an established and self-contained media system, i.e., not draw significant TV or radio input from other cities.
- Have a cooperative and accessible school system.

Columbus met the above criteria and was selected as a test site. It is a moderate sized city (population 539,677 in the 1970 census) with a sufficient number of child pedestrian accidents to support an accident based evaluation. Also, it was part of the NHTSA/FHWA data base (see Knoblauch and Knoblauch, 1976) which meant that some accident data would already be available and the remaining data would be more accessible. While Los Angeles (population 2,816,061 in the 1970 census) also met the above criteria, its choice as a test city was based more on the needs of the adult messages test than on the children. Specifically, it is one of only a few cities which has a substantial number of Multiple Threat accidents as well as turning vehicle accidents. Clearly, Los Angeles also has a sufficient number of child accidents to support an evaluation of the child messages.

During January and February of 1976, the child message test was initiated in both Los Angeles and Columbus. However, in mid-February, the Columbus Board of Education, prompted by pressure from local groups, withdrew support from the program and refused to show the "Willy Whistle" film in their school system. A meeting in Columbus in February, 1976 failed to regain the school system's support. The basic issue of contention involved the depiction of children crossing midblock and between parked cars. Despite much substantive data to the contrary, it was feared by Columbus officials that the approach taken in the "Willy Whistle" film might encourage midblock crossings and/or undermine the faith the children have in an educational system that had been teaching "cross at the green" for years. The withdrawal of the school system's support removed one major source of exposure of the target audience to the child dart and dash messages, i.e., the school classroom. Moreover, those in Columbus opposed to the project began lobbying to prevent showing of the TV spots. Thus, rather than continue in Columbus, it was decided to cease all program activities in that city and recall all media materials for possible use elsewhere.

In the months that followed, negotiations continued with Columbus officials to determine what they would allow in their school system. Agreement was achieved on the production of a new set of materials which would use virtually the same script but would show children crossing at a non-signalized "T" intersection. The behavioral advice when crossing from the top of the "T" is the same as when crossing midblock, thus the educational objectives remained the same. However, by showing the crossing at an intersection, the primary Columbus objections were eliminated. This new version of the film (entitled "Meet Willy Whistle") and the six TV spots were produced during the Summer and early Fall of 1976. The child messages test using these new materials was re-initiated in Columbus during February, 1977.

Thus, Los Angeles had the original "Willy Whistle" materials (along with the adult materials) and Columbus had the new version. It still remained to test the original midblock version in a "pure" test. The city selected for this test was Milwaukee. Milwaukee (population 717,372 in the 1970 census) met the site selection criteria discussed above and was large enough and had a sufficient number of child accidents to support an evaluation. The Milwaukee schools and the Milwaukee Safety Commission accepted the original midblock version of the materials after it was agreed to modify the six minute film to include a brief statement on intersection crossing. The statement, at the beginning of the film advises children that they should cross at a crosswalk or with a crossing guard but recognized that this is not always possible. The test was initiated in Milwaukee during February, 1977.

In summary, three cities were used to test the child messages. Los Angeles received the original version of the materials as well as the adult materials which are now felt to have had minimal impact or no impact on the child test. Columbus received the "T" intersection version of the materials and Milwaukee received the original version with the modified opening to the six minute classroom film. The test in each city was intended to be city-wide excluding no segment of the child population nor any geographical segment or district. The Los Angeles test was initiated in January, 1976; Columbus and Milwaukee were initiated in February, 1977.

B. Distribution

The child materials, whether original (Los Angeles), modified (Milwaukee) or new (Columbus) consisted of:

- o 6 minute film (with poster and supporting documentation to teachers)
  - 16mm for school use
  - 35mm for theater use (original and new versions only)
- o 6 television spots
  - 3 - 30 second spots
  - 3 - 60 second spots

Distribution strategies were therefore required for elementary schools, theaters and television stations.

1. Schools

In each of the cities, school distribution was accomplished primarily through the central office of the public schools. Copies of the 16mm film were provided to Los Angeles for distribution to the schools. The Los Angeles central office also received mailing tubes such that copies of the poster and an introductory letter could be mailed to each elementary school. This letter introduced the posters and invited the schools to request the six-minute film available from the central office. The response to this letter during the Spring of 1976 was minimal. Therefore, beginning in the Fall of 1976, a more direct approach to Los Angeles film distribution was adopted. Each elementary school in the Los Angeles Unified School District was contacted directly by telephone or inter-school mail and scheduled to receive the film. Scheduling was such that most elementary schools in Los Angeles (city) received the film during the '76-'77 school year and nearly all schools in the full Unified District received the film by the Fall of 1977.

School distribution in Columbus proceeded in much the same fashion as in Los Angeles. Copies of the film were provided to the audio-visual aids department of the Columbus public schools. Posters and introductory letters were sent to the public schools, and, in a separate mailing, posters and a similar offer to borrow the film was extended to the parochial schools. The Columbus Board of Education radio station also received sound tracks from the children's television spots for in-school airing.

School distribution in Milwaukee followed a similar pattern to Los Angeles and Columbus. Posters and letters were sent in the late Winter of 1977 to the public elementary schools, Catholic schools and Lutheran schools. Requests for the film were handled by the Milwaukee Public Museum which provides audio-visual support for schools, groups and organizations throughout Milwaukee County. A second mailing to schools was made during the Fall of 1977 to reacquaint the schools with the offer to borrow the film. Copies were also made available to the public schools for the in-school television network.

2. Television

Early in the development of the planning for distribution of the television spots and the Willy Whistle long film, a very essential step became clear. Namely, for our materials to achieve the greatest possible exposure, it would be necessary for the project staff to deliver the media materials in person to public service program directors and other users of the materials. Since the cooperation was purely voluntary and not purchasable, it seemed wise to create an atmosphere of concern and importance.

Prior to distributing any materials to TV stations, meetings were held with their public service directors. In Los Angeles and Columbus, this was accomplished by making a presentation at a regular monthly meeting of these individuals. In Milwaukee, each station was contacted separately as a group meeting could not be conveniently arranged. The purpose of these initial contacts was to introduce the materials and describe the importance of obtaining exposure to the entire field test process. Follow-up discussions with the public service advertising directors of the stations towards the end of the campaign clearly indicated that these preliminary discussions played a major role in securing the significant air time the Willy Whistle spots received.

Media materials were delivered to Los Angeles during January 1976. All materials were presented in person with a summary of the research project objectives, developmental methodology, message contents and a plea for the maximum broadcast frequency possible within public service allotments. It was requested that the materials not be played before 1 February 1976, the official start time. The specific "first wave" spots distributed were the 60 second "Whole Story" and the 30 second "Search" messages. The television stations contacted were:

- KABC
- KBSC
- KHJ
- KNBC
- KNXT
- KTLA
- KTTV
- KWHY
- KMEX
- KCOP

Some television stations agreed to take a copy of the Willy Whistle long film, but no data were available on the extent to which these were used. As added incentive and reinforcement for the broadcast stations to give us maximum public service broadcast time, we advised them that NHTSA certificates of appreciation would be presented to them for their cooperation. These certificates and the remaining four TV spots were distributed in Los Angeles during the spring and summer of 1976.

In Columbus, during February, 1977, copies of the 60 second "T" intersection "Whole Story" and 30 second "Search" spots were distributed to the following television stations:

- WBNS
- WLWC
- WTVN
- WOSU

Some stations expressed an interest in showing the Willy Whistle 16mm long film as part of a children's feature and were provided with the film. Columbus stations were provided with certificates and the remaining TV spots during the Fall of 1977.

In Milwaukee, also during February, 1977, copies of the 60 second "Whole Story" and 30 second "Search" spots were distributed to the following television stations:

- o WISN
- o WITI
- o WTMJ
- o WVTV

One station expressed an interest in the six-minute film and was provided a copy. Milwaukee stations were provided with certificates and the remaining TV spots during the Fall of 1977.

3. Theaters

Film distributors and/or major chains of movie theaters were contacted in each of the three cities. Distributors were asked to accept 35mm copies of the six minute film and show this film in conjunction with children's movies, cartoons, etc. In general, the response from the distributors was excellent. However, the coverage achieved was apparently greater in Milwaukee and Columbus than in Los Angeles as one major Los Angeles distributor declined the offer. Copies of the film were made available during February, 1976 in Los Angeles and February and March, 1977, in Columbus and Milwaukee.

C. Measurement of Message Exposure

Attempts were made in each of the cities to find out how many times the films were shown in classrooms and the TV spots were aired. Obviously, the primary measure of exposure in this study was the self-reported exposure from the sample of children interviewed. Those interview results will be reported in the next chapter. Nevertheless, independent measures of in-school and television exposure were sought and will be discussed below. These measures consist of the number of children viewing the film in-school and the number of television plays.

1. Schools

In Los Angeles, the measure of in-school exposure was the mailback postcard. Each film delivered to the schools included a supply of mailback postcards to be completed by classroom teachers (or principals when the film was shown at a school assembly) and returned to the central office. The data requested on the card was age of children in the audience, number of children, date shown and school name. During the Spring of 1976, the returned postcards indicated that only 2,673 students had seen the film. This represented less than 1% of the total school age population in Los Angeles and prompted a change in the film distribution strategy. Simply, as referenced above, delivery of the film was directly scheduled by the central office as opposed to waiting for requests. This change was instituted during the Fall of 1976 and was far more successful in ensuring that each child in the school system had an opportunity to view the film. Table 1 shows a tabulation of postcards received following this change in procedure. As indicated in the Table, over 100,000 children between the ages of 5-12 saw the film. The 1970 U.S. Census shows 241,152 children in Los Angeles between the ages 5-9. The postcards indicate that 80,669 or about one third of these children saw the film. The Table also shows that film distribution to children and schools not in the City of Los

Table 1. Number of Children Who Saw the "Willy Whistle" Film in Los Angeles as Indicated by Returned Post Cards.

Month		Child Age (in years)									
		5	6	7	8	9	10	11	12	other/ unknown	Total*
1976	October	320	471	1,543	288	385	1,141	410	170	—	4,728
	November	936	1,317	955	600	704	299	590	54	806	6,261
	December	177	223	240	197	149	369	243	0	180	1,778
1977	January	1,189	1,573	1,648	1,155	1,069	746	971	457	262	9,070
	February	1,553	2,716	4,550	3,040	1,848	2,110	1,546	436	107	17,906
	March	1,115	2,896	4,268	3,817	3,670	4,154	1,871	510	491	22,792
	April	1,574	1,412	4,300	3,805	3,590	3,666	2,815	465	606	22,233
	May	904	1,070	1,213	2,015	1,687	1,411	1,071	233	86	9,690
	June	—	—	—	—	—	—	—	—	—	0
	July	134	810	939	1,130	1,273	991	281	85	30	5,673
	August	156	688	846	2,458	1,809	1,335	492	70	28	7,882
	September	—	—	—	—	—	—	38	—	—	38
	October	599	670	599	431	460	451	358	18	26	3,612
	November	39	125	323	720	212	234	360	16	—	1,275
	December	0	36	30	—	—	—	—	—	—	66
	Total L.A.	8,696	14,007	21,454	19,656	16,856	16,907	11,046	2,514	2,622	113,920
1977 (not L.A. city)	September thru December	1,793	3,498	2,732	2,604	1,681	1,884	1,237	252	45	15,726

* Total does not include 2,073 children who saw the film during the Spring of 1976, and 70 returned cards with no number of children listed (estimated to represent a minimum of 2,000 or more children).

Angeles. Typically, these schools were within the Los Angeles Unified School District, but not within the City of Los Angeles. They are shown separately since the accident statistics discussed below cover the city only and not those parts of the Unified District which are outside the city. In general, it is felt that the returned postcards represent a considerable under-estimate of the number of children actually seeing the film because many teachers did not return the postcard.

School exposures in Columbus were to be monitored by the same mailback postcard system as was used in Los Angeles. However, as the study developed, the mailback system in Columbus never provided much data. Returned postcards indicated that only about 900 children saw the film. Why the system failed is not known. It could be that cards were not regularly distributed with the film by the audio-visual center or that teachers simply did not fill out the cards. Thus, the number of exposures in the classrooms is not known but is surely much higher than 900 based on discussions with people in Columbus and the survey results discussed below.

School exposure in Milwaukee came both from the in-school television network and from film loan through the Milwaukee Public Museum. The in-school network was not subject to monitoring or mailback postcards. However, it is known that the film was aired on the network in excess of 50 times primarily during the Spring and Fall of 1977. Each play could have been viewed by all public school students if their classroom set had been turned on. The Museum recorded the number of times the film was lent and the number of people viewing the film for each loan of the film. These records indicate that 7,597 (includes 772 from postcards) people viewed the film during the Spring of 1977, 3,470 in the Fall of 1977, 1,651 in the Winter-Spring of 1978 and 1,151 during the remainder of 1978 and early 1979 for a total of 13,869 viewings. It is estimated that this represents up to 20% of the elementary school age population in the city.

2. Television

Measurement of Los Angeles television exposure was accomplished through the use of an independent television monitoring service, Broadcast Advertisers Reports, Incorporated (BAR). This service reported on all activity for the distributed Willy Whistle spots beginning on 2 February 1976. Their reports are summarized in Table 2. The figures indicate that the spots were played 380 times on the major Los Angeles television stations. Most of the plays were during the morning or the late afternoon coincident with children's programs. In addition, reports from the stations themselves indicate that there were additional plays prior to the 7 A.M. start for monitoring. The estimated commercial value of this air-time was $148,513.

Measurement of Milwaukee and Columbus television exposure was accomplished by asking the stations to supply log sheets showing the number of plays by date of the play. Some stations did not report, others provided reports covering only a portion of the period of interest. Two Milwaukee stations agreed to allow a project staff member to examine their internal logs for public service announcements for the period beginning February, 1977 and ending May 31, 1978. Thus, some of this missing data problem was eliminated in Milwaukee. Nonetheless, despite the missing data, the logs showed over 200 plays of our materials in each city. The distribution of known plays by month for the fifteen months covered by the logging procedure is shown in Table 3.

Table 2. Television Exposure for Willy Whistle in the Los Angeles Market.

		Number of Plays	Estimated Commercial Value
1976	February	9	$ 745
	March	6	1,725
	April	6	650
	May	9	3,140
	June	19	7,300
	July	30	10,410
	August	16	4,825
	September	8	1,645
	October	11	5,025
	November	17	5,100
	December	10	7,900
1977	January	6	2,575
	February	2	300
	March	5	1,625
	April	4	1,385
	May	0	0
	June	12	6,353
	July	19	7,390
	August	20	11,950
	September	19	7,635
	October	25	9,150
	November	9	4,510
	December	23	10,525
1978	January	18	9,225
	February	12	5,050
	March	12	4,325
	April	20	9,150
	May	10	3,800
	June	4	1,650

Table 2. (Continued). Television Exposure for Willy Whistle in The Lost Angeles Market.

		Number of Plays	Estimated Commercial Value
1978 Continued	July	5	$ 915
	August	7	910
	September	1	20
	October	1	400
	November	1	80
	December	4	1,125
	Total	380	$148,513

Total Plays by Time of Day

Time	Number of Plays
7:00-7.59 a.m.	128
8:00-9:59 a.m.	110
10:00 a.m.-1:59 p.m.	32
2:00-5:59 p.m.	86
6:00-11:59 p.m.	9
Midnight-6:59 a.m.	15
Total	380

Table 3. Television Exposure for Willy Whistle in the Milwaukee and Columbus Markets.

		Number of Plays	
		Milwaukee	Columbus
1977	March	22	—
	April	31	11
	May	24	30
	June	20	31
	July	18	39
	August	12	27
	September	11	18
	October	5	20
	November	13	—
	December	13	13
1978	January	17	10
	February	9	—
	March	13	—
	April	10	12
	May	16	—
	Totals	234	211

D. Summary

The child messages tell children to stop at the curb (or outside edge of a parked car) and look left-right-left before crossing. These messages are carried by a six-minute film, six television spot announcements and a poster. The film was distributed to elementary schools and to theaters. The television spots were distributed to television stations. The poster was distributed to elementary schools. The primary objective of the distribution effort was to reach as many young children as often as possible. The messages themselves address the primary behavioral errors leading to midblock, dart and dash, child pedestrian accidents. Message distribution was accomplished similarly in Los Angeles (California), Columbus (Ohio) and Milwaukee (Wisconsin).

It was concluded that the distribution effort was highly successful at least when compared with the exposure the stations said they give to typical public service campaigns. It is believed that this success was based upon the strong support of the respective school systems and the cooperation of local television stations. The television stations reported that competition for public service air-time is intense relative to adult materials, but much less severe with regard to children's programming. It is felt that this factor, as well as the personal contact established with station public service directors, helped account for the large number of television exposures.

The Los Angeles test ostensibly began in February of 1976. However, exposure data indicate that a substantial number of television exposures were not achieved until the Summer of 1976 and in-school exposure to the six-minute film did not substantially begin until the Fall of 1976. The large majority of in-school exposures were achieved in 1977 and the first few months of 1978. Therefore, in Los Angeles, it may be concluded that 1976 was a transition year, 1977 was the year of greatest exposure and 1978 was a post-campaign period with some exposure to the materials particularly in the early months. Exposure data clearly suggest that the majority of children in the city were exposed to at least some of the materials during the period from late 1976 to early 1978.

Exposure in Columbus could not be monitored as closely as in Los Angeles or Milwaukee. It is felt that in-school exposure was achieved but the extent of this exposure could not be documented. Television exposure was substantial (over 200 plays) particularly during the late Spring and Summer of 1977. Therefore, in Columbus, it appears that the first few months of 1977 were transition months with the remainder of 1977 being the period of greatest exposure.

Exposure data for Milwaukee indicate that the test of the messages began in that city during the early part of 1977 with little or no delay or transition period. In-school exposure was high both in the Spring and Fall of 1977. Television exposures began in March of 1977 and remained high through the first five months of 1978 with over 200 plays during the 15 month monitoring period. Therefore, it appears that the greatest exposure in Milwaukee was achieved during the Spring, Summer and Fall of 1977 with some additional exposure during 1978. Figure 1 summarizes the test milestones in each city.

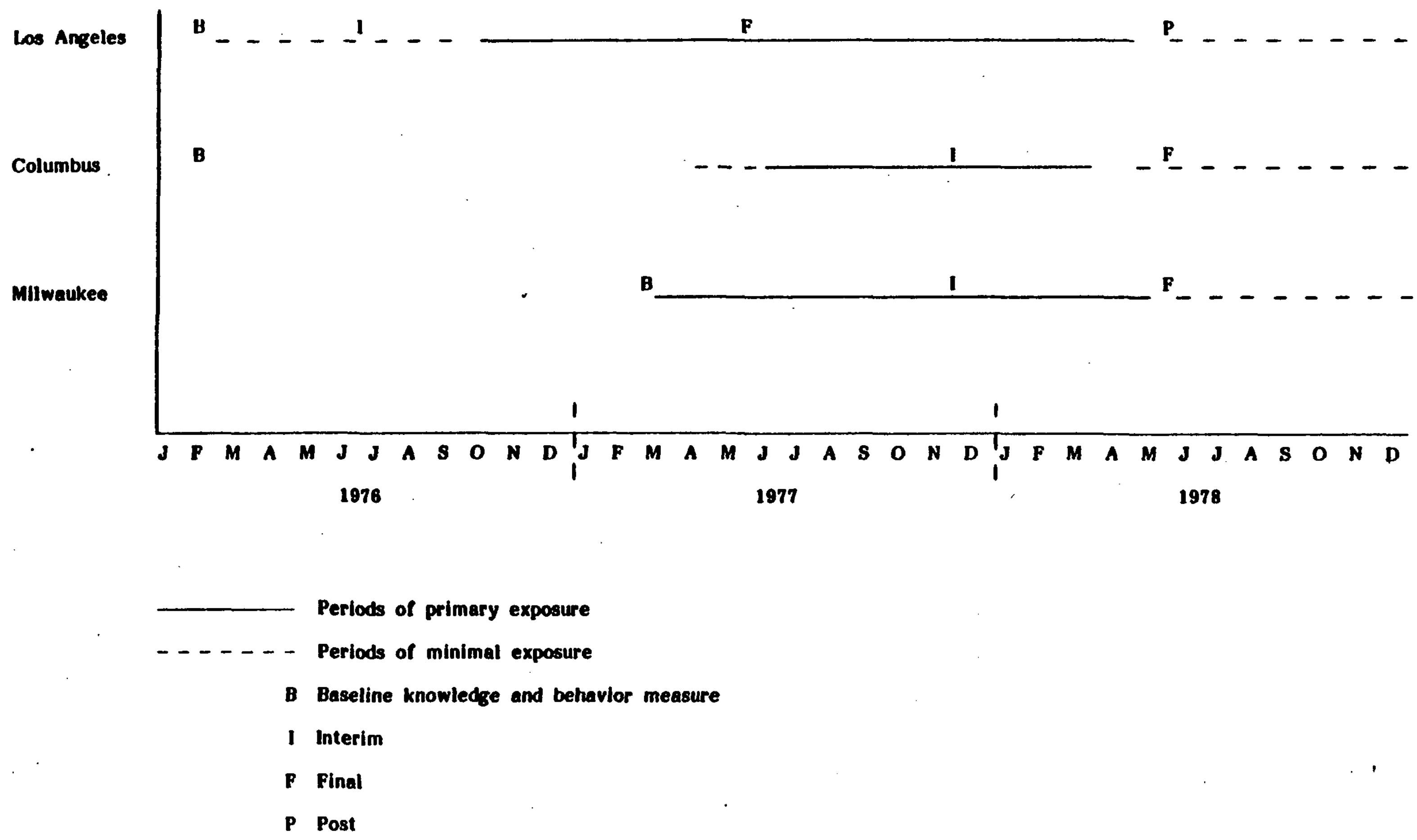

Figure 1. Schedule for Materials Exposure and Knowledge and Behavioral Measures.

III. KNOWLEDGE AND RECALL OF EXPOSURE

The preceding chapter discussed the extent to which the materials were shown in schools and on television stations. The results indicated that there was an opportunity for children to view these materials. However, exposure by itself does not necessarily imply reception, or long term recall or that knowledge of safe street crossing behavior would be improved. This chapter will present the results of the in-school child survey. The purpose of this survey was to assess safe street crossing knowledge among children and recall of program materials. The survey was administered pre, interim and post on different samples of children in all three cities. The results indicate that the materials were seen, the "Willy Whistle" character was memorable and that relevant pedestrian safety knowledge improved.

A. Method

A questionnaire was developed to measure child understanding of correct street crossing behavior related to the pedestrian accident situations under study, as well as to measure the nature and extent of exposure to the related media materials. The child messages originated from three media sources: television (30 and 60 second spots); school presentation ("Willy Whistle" long film and poster) or movie theaters ("Willy Whistle" long film as a trailer to a children's feature presentation). The child questionnaire sought to identify the relative contribution of these input channels to message exposure. In addition, knowledge of safe crossing behavior for the situations addressed by the media materials was also assessed. The street crossing knowledge presented by the television spots and long film and assessed by the questionnaire was related to the following traffic situations:

- o Looking for cars and crossing the street with no parked cars nearby (stop at curb and look left-right-left);
- o Looking for cars and crossing the street with parked cars nearby (go out to the edge of the parked car, stop and look left-right-left);
- o Looking for cars all over again after detecting an oncoming car (reinitiation--let car pass and look left-right-left again).

The child questionnaire which was employed is shown in Figure 2. This in-school instrument was designed to be as brief as possible and to be pre-coded for as many potential responses as possible, minimizing the requirement for the interviewer to write down answers.

Information related to the age, sex, race and grade of the child as well as the school, date, etc., were filled in by the interviewer at the top of the form. Questions 1, 2 and 3 dealt with knowledge of safe street crossing when there (1) were no parked cars, (2) with parked cars and when (3) "reinitiation" was necessary. Question 4 asked about knowledge of left versus right. Questions 5 through 8 were designed to measure recall of exposure to the materials in school, on television and in movie theaters. Questions 9 and 10 asked specifically about Willy Whistle.

Child Pedestrian Safety Interview

Interviewer________________________ F(1) City____________________ F(2, 3) School______________
(4) Date______________ (5) Grade_____ (6) Child's Sex 1. M__ 2. F__ (7) Child's Race 1. W__
2. B__ 3. S__ 4. O__

General Instructions: Check all that apply for each question. Where appropriate, probe without prompting to insure that the child has told all for each question (e.g., Is there anything else?). If child answers "nothing" or "I don't know", wait several seconds. If the child says nothing, enter the appropriate null response.

1. Make believe that you're on a sidewalk with no parked cars near you and want to cross the street. There is no one around to help you cross. What, if anything, should you do before crossing the street to be safe?

(8) ___Go to corner
(9) ___Stop at curb
(10) ___Wait for light
(11) ___Look for cars. ASK TO SHOW HOW!
(12) 1. ___Look L
2. ___Look R
3. ___Look R-L
4. ___Look L-R
5. ___Look L-R-L
6. ___Look R-L-R
(Check Only One)
(13) Other______________________
(14) ___Nothing
(15) ___Don't know

2. Now you're on a sidewalk with parked cars right near where you want to cross the street. What, if anything, should you do before crossing the street to be safe?

(16) ___Go to corner
(17) ___Stop at curb
(18) ___Wait for light
(19) ___Stop at outside edge of parked cars
(20) ___Look for cars. ASK TO SHOW HOW!
(21) 1. ___Look L
2. ___Look R
3. ___Look R-L
4. ___Look L-R
5. ___Look L-R-L
6. ___Look R-L-R
(Check Only One)
(22) Other______________________
(23) ___Nothing
(24) ___Don't know

3. You want to cross the street and you've stopped to look for cars that might be coming. While you're looking, you see one coming close. What, if anything, should you do before crossing the street to be safe?

(25) ___Let the car pass
(26) ___Look for cars all over again. ASK TO SHOW HOW!
(27) 1. ___Look L
2. ___Look R
3. ___Look R-L
4. ___Look L-R
5. ___Look L-R-L
6. ___Look R-L-R
(Check Only One)
(28) Other______________________
(29) ___Nothing
(30) ___Don't know

(31) **4.** Please show me your left hand.

1. ___Correct response
2. ___Incorrect response
3. ___No response

Figure 2. Child Interview Form.

(32) **5.** Have you watched or seen anything lately that told you how to cross the street safely?

1. ___Yes (go to 5a)
2. ___No (go to 5b)
3. ___Don't know/remember (go to 5b)

(33) a. Where did you see what you saw? *

*(Code response order by writing 1 next to first answer given, 2 for second, etc.)

1. ___School (go to #6 for details)
2. ___T. V. (go to #7 for details)
3. ___Movie theatre (go to #8 for details)
4. ___Other (go to 5b) ______________________
5. ___Don't know/remember (go to 5b)

(34) b. How about in school? (Complete this entire section)

1. ___Yes (go to #6 for details)
2. ___No

(35) How about on T. V.?

1. ___Yes (go to #7 for details)
2. ___No

(36) How about in a movie theatre?

1. ___Yes (go to #8 for details)
2. ___No

(If all no's above, go to #9)

(37) **6.** What have you seen in school?

1. ___Nothing
2. ___Willy Whistle--film
3. ___Willy Whistle--poster
4. Other__________________________
5. ___Don't know/remember

(Go to #7 and #8 if coming from #5a)

(38) **7.** What have you seen on T. V.?

1. ___Nothing
2. ___Willy Whistle
3. Other__________________________
4. ___Don't know/remember

(Go to #6 and #8 if coming from #5a)

(39) **8.** What have you seen in the movie theatre?

1. ___Nothing
2. ___Willy Whistle
3. Other__________________________
4. ___Don't know/remember

(Go to #6 and #7 if coming from #5a)

(40) **9.** Do you know who Willy Whistle is? (Ask only if W. W. not mentioned before.)

1. ___Yes
2. ___No (terminate interview)

10 What does Willy Whistle tell you to do?

(41) ___How to cross streets safely
(42) ___Stop at the curb
(43) ___Look L-R-L
(44) ___Stop at edge of parked cars
(45) ___Reinitiation
(46) Other____________________________
(47) ___Don't know/remember

Figure 2. (Continued). Child Interview Form.

Children were interviewed one at a time by a trained interviewer. Each interview lasted approximately two to three minutes. Interviews were typically conducted in a quiet area close to, but not in, the child's classroom. Interviewers were instructed to:

- o Take care that remarks, facial expression and tone of voice conveyed a benign, non-evaluative attitude to the children;
- o Be especially patient with the younger children;
- o Refrain from prompting children or putting words in their mouths;
- o Be careful to use the simplest language possible on any probes;
- o Conduct the interview as quickly as possible without being abrupt.

Sampling within each of the cities was conducted in elementary schools and was based on grade level within school. Six schools in each city were selected such that each had:

- o Average/representative student body as far as racial and socio-economic mix, scholastic achievement and reading level;
- o Willingness of the school administration to cooperate (i.e., allow interviews of various grade levels of students) through all measurement phases.

These six schools in each city remained as the sampling schools throughout the course of the study. In general, all of the children at one grade level were interviewed at one school for one wave of measurement. A different grade level at that school was selected for the next wave of measurement and so on such that no child would be interviewed more than once during the entire study. This basic experimental design may be diagrammed as follows:

School	Grades						
	K	1	2	3	4	5	6
1	B		I		F		
2		B		I		F	F
3	F		B		I		
4		F		B		I	I
5	I		F		B		
6		I		F		B	B
B - Baseline; I - Interim; F - Final							

Schools were randomly assigned to conditions in the above design, and fifth and sixth grades were treated as one grade level for sampling purposes. This design was followed conceptually throughout the study though some particulars were changed to reflect changing schedules such as the one year delay in Columbus.

A baseline or "pre" measure was taken in Los Angeles and Milwaukee approximately two to four weeks prior to distributing the films, posters and TV spots. Because of the distribution problems discussed earlier, the Columbus baseline was taken about one year prior to distribution of the materials. The interim measure was intended to coincide with the peak of the campaign and the final measure was intended to occur at the end of the study. In addition, a fourth or "post" measure was taken in Los Angeles to examine behavior after the program had been in place for a considerable period of time. Each measure or survey wave in each city took approximately one-and-a-half to two weeks to complete and was conducted coincident with the behavioral observations discussed in the next chapter of this report. The actual timing of each measure was as follows:

Measurement Wave	Los Angeles	Columbus	Milwaukee
Baseline	Jan. 1976	Jan. 1976	Feb. 1977
Interim*	May 1976	Nov. 1977	Nov. 1977
Final	May 1977	May 1978	May 1978
Post	May 1978		

During the course of this study, a total of 3,756 children were interviewed across all three cities. The distribution of these children by age, sex and race is shown in Table 4. While these distributions do show a great deal of similarity from one wave of measurement to the next, there is nevertheless some variation. In particular, there is variation associated with sample size per grade level since the sampled grade level at any given school changed from wave to wave which meant that a high enrollment school might contribute a large sample to, say, the third grade in baseline, then the fifth and sixth grade during the interim measure, then the first grade during the final measure. It is not believed that this variation materially influenced the survey results.

B. Results--Exposure to the Program

Exposure questions on the child survey were asked after the knowledge items. Knowledge of safe street crossing was obviously the more important consideration and thus it was assessed first such that any discussion of exposure could not influence the knowledge results. The exposure items began with item number five which asked whether the children had seen anything about safe street crossing. This was primarily a lead-in type item designed to start the children thinking about safety messages. The results, shown in Table 5, indicate that most children across all three waves of measurement reported seeing or watching something about safe street crossing. Much of this simply represents a general level of safety information to which the children are normally exposed. However, in each city, this general level did increase corresponding to the media distribution effort.

*As referenced in the last chapter, materials distribution in Los Angeles began very slowly, thus the interim measure was essentially a second baseline, the final measure more closely resembled interim in the other cities, etc.

Table 4. Distribution by Grade, Sex and Race of Interviewed Children.

	Los Angeles				Columbus			Milwaukee		
	Base	Interim	Final	Post	Base	Interim	Final	Base	Interim	Final
N =	357	424	401	301	329	345	293	453	430	423
Grade Level										
K	16%	12%	10%	16%	7%	7%	7%	25%	21%	23%
1	18	10	14	14	9	22	14	25	20	10
2	16	13	18	13	14	9	18	5	10	17
3	16	14	13	18	27	18	13	6	12	19
4	16	13	15	21	16	16	15	12	16	13
5	9	14	16	4	14	12	17	14	9	9
6	9	23	13	13	12	15	16	15	11	9
Sex										
Male	55%	56%	53%	54%	56%	53%	53%	47%	59%	53%
Female	45	44	47	46	44	47	47	53	41	47
Race										
White	85%	82%	72%	71%	71%	71%	70%	50%	46%	51%
Black	8	7	12	7	28	26	27	38	42	37
Hispanic	6	9	12	16	--	--	--	11	11	10
Other	1	2	3	6	1	3	2	1	1	2

Table 5. Child Survey Results for Exposure Items—Unaided Recall.

	Los Angeles				Columbus			Milwaukee		
	Base	Interim	Final	Post	Base	Interim	Final	Base	Interim	Final
N =	357	424	401	301	329	345	293	453	430	423
#5. Seen anything about safe street crossing?										
Yes	61%	57%	63%	69%	47%	66%	72%	69%	75%	77%
#6. Seen in school?										
Mention of Willy Whistle material	0%	0%	4%	5%	0%	14%	13%	0%	17%	25%
#7. Seen on TV?										
Mention of Willy Whistle material	0%	0%	8%	25%	0%	29%	40%	0%	30%	40%
#8. Seen in movie theater?										
Mention of Willy Whistle material	0%	0%	0%	0%	0%	2%	2%	0%	3%	3%

Questions six through eight asked the children to describe what they saw in school, on television and in a movie theater. These questions may be thought of as unaided recall. In other words, the child was asked to recall the specific materials being tested without the benefit of prompts other than "safe street crossing." The results (Table 5) showed that at least some of the children were able to remember the Willy Whistle materials. Concerning school materials in Los Angeles, the figures were 4% and 5% at the time of the final and post measures, respectively. In Columbus, 14% and 13% recalled the materials. The strongest in-school results were from Milwaukee with 17% and 25% recalling the materials in the interim and final measures respectively. This result could possibly be related to the extensive Milwaukee in-school television programming of the Willy Whistle film. The next set of results cover recall of television exposure. These figures are higher than the in-school results, peaking at 25% for Los Angeles and 40% for both Columbus and Milwaukee. This 40% figure is extremely high for any unaided recall of a public education message. The last set of data cover recall of movie theater exposures which were uniformly low in all three cities. Thus, it appears that television provided the most memorable Willy Whistle exposures followed by the in-school presentations, followed by a minimal effect from the movie theaters.

While Table 5 covered unaided recall, Table 6 covers Questions 9 and 10 which can be thought of as aided recall. Specifically, Question 9 asked whether the child knows who Willy Whistle is. At baseline, 10%, 7% and 11% of the children responded "yes" in Los Angeles, Columbus and Milwaukee respectively despite the fact that none could have been exposed to the material. This result is not surprising since some children will simply respond "yes" to almost any question. Nevertheless, recognition of "Willy" rose rapidly as campaign materials were distributed. In Los Angeles, the percentage of children who said they knew Willy was 12% at the interim measure, rising to 43% for the final measure and 71% for the post measure. Similarly, in Columbus, the percentage responding "yes" rose to 72%. The Milwaukee figures showed the greatest rise, peaking at 83%.

Question 10 attempted to determine whether the children could relate their recognition of "Willy" to any specific safety information. The results, also shown in Table 6, provide an indication as to what behavioral advice was most memorable to the children. The first response shown is for the general idea that Willy tells you how to cross the street safely. This response peaked at 31%, 34% and 42% in Los Angeles, Columbus and Milwaukee respectively. The next group of responses cover specific behavioral advice. The results show that the search message of look left-right-left was most memorable in all three cities. This was followed by the stopping messages. The reinitiation message was clearly the least memorable. The last group of data for Question 10 in Table 6 covers any child mention of pedestrian safety items. The results showed that Willy Whistle was related to safety by 67% of the Los Angeles children in the Post measure and 67% of the Columbus children in the Final measure. The comparable figure for Milwaukee was 80% which, again, indicates that the Willy materials had their greatest target group penetration in Milwaukee.

Separate analyses were performed to examine these results with respect to child grade level and sex. Concerning grade, there was one result which was consistent in all three cities. Children in kindergarten, and to a lesser extent in grades one and two, were least able to recall "Willy" and relate him to safe

Table 6. Child Survey Results for Exposure Items--Aided Recall.

	Los Angeles				Columbus			Milwaukee		
	Base	Interim	Final	Post	Base	Interim	Final	Base	Interim	Final
N =	357	424	401	301	329	345	293	453	430	423
#9. Do you know who Willy Whistle is?										
Yes	10%	12%	43%	71%	7%	64%	72%	11%	69%	83%
#10. What does Willy tell you to do?*										
Cross safely	2%	1%	19%	31%	1%	26%	34%	2%	30%	42%
Look L-R-L	0	1	12	28	0	33	37	0	23	38
Reinitiation	0	0	3	3	0	5	7	0	2	5
Stop curb	0	0	3	16	0	8	12	0	9	21
Stop edge of parked car	0	0	8	6	0	21	19	0	13	13
Any safety related (includes all of the above)	3	6	38	67	3	60	67	4	61	80

*multiple answers accepted

street crossing. It is felt that this effect is more the result of young children's inability to verbalize the appropriate responses to the interviewer than any lack of effectiveness of the material. Concerning sex, there was a clear but small tendency for males to relate Willy to safe street crossing more often than females. This tendency is quite beneficial since, among children, males are more often involved in pedestrian accidents.

C. Results--Knowledge

Recall of "Willy Whistle" indicates only that the materials were seen and remembered by the children. It does not mean that they received the message and learned how to cross the street more safely. Knowledge of safe street crossing was assessed using questions one, two and three of the child questionnaire (see Figure 2). These questions dealt with safe street crossing when: (1) there were no parked cars; (2) when there were parked cars; and (3) when reinitiation was necessary (i.e., when a car was coming and thus it was necessary to let the car pass and look left-right-left all over again). The results clearly showed that children did demonstrate more safe street crossing knowledge following exposure to the Willy Whistle materials.

The results for Question 1 in Los Angeles, Columbus and Milwaukee are shown in Table 7. This was a free response question and multiple answers were coded. To be correct, the child should have said "stop at the curb" (course response) and look left-right-left (search response). The first part of this table shows child "mentions" of correct course behavior. In Los Angeles, only 3% of the children said stop at the curb (or similar response) during baseline and this figure did not increase over the remaining waves of measurement (χ^2 = 4.02, N.S. with 3 d.f.). In Columbus, 4% of the children offered the correct response during baseline increasing to 8% and 10% during the interim and final measure, respectively (χ^2 = 8.34, $p<.05$ with 2 d.f.). In Milwaukee, the comparable figures were 7%, 7% and 18% (χ^2 = 36.97, $p<.001$ with 2 d.f.). Thus, the Los Angeles data show no increase, Columbus shows a small gradual increase and Milwaukee shows a large increase but only during the Final measure.

The second group of figures shown in Table 7 cover knowledge of search behavior. The correct response, which could have been demonstrated by the child as opposed to verbalized, was to look left-right-left. This response was given by 11% of the Los Angeles children during baseline, 12% during interim, increasing to 29% final and 44% post. This increase, correct versus all other responses, was statistically significant (χ^2 = 142.12, $p<.001$ with 3 d.f.). For the most part, children who earlier may have said look both ways or just look, gave the correct left-right-left search sequence. The number of children who didn't mention "looking" at all remained about equal across the four measurements. In Columbus, the increase in correct responses was from 3% to 39% to 42% which was also statistically significant (χ^2 = 152.17, $p<.001$ with 2 d.f.). Here, however, the number of "don't know" or wrong responses decreased as did the number of responses in the look and look both ways categories. Milwaukee showed the greatest knowledge gain with correct responses starting at 6% baseline to 30% interim to 61% during the final measure. This was again statistically significant (χ^2 = 298.44, $p<.001$ with 2 d.f.) and this gain was achieved with decreases in all of the remaining categories. In particular, "don't know" or wrong responses dropped from 25% baseline to 8% post. Thus, children in all three cities learned the correct

Table 7. Question #1--Knowledge of Safe Street Crossing with No Parked Cars.

	Los Angeles				Columbus			Milwaukee		
	Base	Interim	Final	Post	Base	Interim	Final	Base	Interim	Final
N =	357	424	401	301	329	345	293	453	430	423
Course										
Correct (stop at curb)	3%	1%	2%	3%	4%	8%	10%	7%	7%	18%
Don't know or wrong or no mention	97	99	98	97	96	92	90	93	93	82
Search										
Correct (left-right-left)	11%	12%	29%	44%	3%	39%	42%	6%	30%	61%
Partial correct (look both ways)	69	71	53	42	76	48	45	62	48	28
Look (not specific)	7	5	3	2	6	3	4	7	3	4
Don't know or wrong or no mention	13	12	15	11	15	10	9	25	18	8

left-right-left sequence. Milwaukee showed the greatest increase in correct responses as well as the greatest decrease in the "don't know" or wrong responses.

The results for Question 2 in Los Angeles, Columbus and Milwaukee are shown in Table 8. Again, this was a free response question and multiple answers were coded. To be correct, the child should have said "stop at the edge of the parked car" (course response) and look left-right-left (search response). The first part of this Table shows child "mentions" of correct course behavior. In Los Angeles, only 8% of the children gave the correct course response at baseline, 14% interim, 48% final and 41% post. This increase, correct versus other responses, was statistically significant (χ^2 = 220.76, p<.001 with 3 d.f.). In Columbus, the comparable figures were 20%, 56% and 76% for a large and also statistically significant increase in mentions of the correct behavior (χ^2 = 198.26, p<.001 with 2 d.f.). Similarly, the increase in Milwaukee was from 4% to 42% to 60% across the three measurements which was also statistically significant (χ^2 = 317.22, p<.001 with 2 d.f.). Thus, children in all three cities showed large increases in knowledge of the correct course behavior near parked cars.

The second group of figures shown in Table 8, cover mentions of search behavior. In Los Angeles, the correct left-right-left response was given by 5% of the children during baseline, 9% interim, increasing to 28% final and 41% post. This increase, correct versus all other responses was statistically significant (χ^2 = 181.95, p<.001 with 3 d.f.). In Columbus, the comparable figures were 2% baseline increasing to 28% interim and 38% final. This increase was statistically significant (χ^2 = 121.52, p<.001 with 2 d.f.). The figures for Milwaukee (4%, 26%, 57% correct) were also statistically significant (χ^2 = 303.05, p<.001 with 2 d.f.). The "don't know" or wrong category of response decreased in all three cities across the waves of measurement.

The results for Question 3 in the three test cities, are shown in Table 9. This was also a free response question with the correct answer being "let the car pass and look left-right-left all over again." This answer was given by 6% of the Los Angeles children during baseline, 6% interim, 18% final and 37% post. This increase, correct versus other responses, was statistically significant (χ^2 = 164.99, p<.001 with 3 d.f.). This increase was associated with corresponding decreases in both the "don't know" category and the partially correct category. The comparable figures for Columbus were 2% to 14% to 28% which also represented a statistically significant increase (χ^2 = 86.03, p<.001 with 2 d.f.). Unfortunately, this increase was associated only with a decrease in the partially correct category and not in the "don't know" or wrong category. In Milwaukee, the increase was from 2% to 16% to 36%. This increase was statistically significant (χ^2 = 177.32, p<.001 with 2 d.f.) and was associated with decreases both in the "don't know" or wrong category and in the partially correct category. Thus, it appears that Milwaukee and Los Angeles children learned the correct reinitiation sequence. Columbus children did learn but most of the gain can be attributed to the left-right-left response and not "let the car pass."

Separate analyses were performed on the knowledge data with respect to child sex and child grade. Males and females were compared for each question in each city at each wave of measurement. No meaningful differences were found for course or search knowledge on Question 1 (crossing with no parked

Table 8. Question #2—Knowledge of Safe Street Crossing with Parked Cars.

	Los Angeles				Columbus			Milwaukee		
	Base	Interim	Final	Post	Base	Interim	Final	Base	Interim	Final
N =	357	424	401	301	329	345	293	453	430	423
Course										
Correct (stop edge of car)	8%	14%	48%	41%	20%	56%	76%	4%	42%	60%
Partial correct (stop at curb only)	5	5	3	6	3	3	2	9	5	2
Don't know, no mention or wrong	87	82	48	53	77	41	22	87	53	38
Search										
Correct (left-right-left)	5%	9%	28%	41%	2%	28%	38%	4%	26%	57%
Partial correct (look both ways)	51	40	39	27	26	36	37	42	43	26
Look (not specific)	7	6	5	4	27	3	6	7	2	3
Don't know, no mention or wrong	37	45	27	29	44	32	19	47	29	14

Table 9. Question #3--Safe Street Crossing When Reinitiation is Necessary.

	Los Angeles				Columbus			Milwaukee		
	Base	Interim	Final	Post	Base	Interim	Final	Base	Interim	Final
N =	357	424	401	301	329	345	293	453	430	423
Correct (let car pass and look left-right-left)	6%	6%	18%	37%	2%	14%	28%	2%	16%	36%
Partial correct (let car pass and look)	38	26	23	21	43	18	20	23	19	12
Retreat (don't cross)	18	21	20	18	13	15	8	24	23	27
Don't know or wrong	37	47	39	24	43	53	45	51	42	25

cars) and only minor differences were found on Question 3 dealing with reinitiation (males were better in the Los Angeles post measure, $p<.05$). Concerning course knowledge on Question 2 (crossing with parked cars), males were better on the Los Angeles post measure ($p<.01$) and the Milwaukee baseline measure ($p<.01$). Concerning search knowledge on question #2, males were better on the Los Angeles post measure ($p<.01$) and the Milwaukee interim measure ($p<.01$). Thus, there appears to be a slight tendency for males to have, or at least express, more street crossing knowledge of the type sought by these questions.

Similar comparisons were performed with respect to child grade and virtually every comparison was statistically significant. In general, older children expressed more street crossing knowledge for each question, in each city at each wave of measurement. These results, averaged across the three cities are shown in Table 10. They indicate that the knowledge gains reported earlier were very consistent across all grade levels. In general, any overall effect, such as an increase in search knowledge, was replicated in each grade K- 6. However, the gains tended to be highest in the middle and upper elementary grade levels. These older children typically expressed slightly more knowledge at baseline and much more knowledge in the later measurements. This may represent greater learning in the middle and upper grades, or, just as likely, may simply reflect the fact that kindergarten children in particular are less able to express themselves.

In conclusion, these data show large and consistent increases in child street crossing knowledge in all three cities. While the Milwaukee results are probably the most striking, the Columbus and Los Angeles results are nearly as large. Increases occurred consistently at all grade levels, K-6, though they tended to be greater above the kindergarten and first grade level. Also, increases occurred for both males and females with males having a very slight advantage. These results clearly indicate that the messages were seen by the children, the messages were remembered and substantial improvements in safe street crossing knowledge were achieved. The next section of this report will examine whether these knowledge gains resulted in safer street crossing behaviors.

Table 10. Knowledge Results by Child Grade.

Grade	N Base	N Interim	N Final	Q #1* course (% stop at curb) Base	Interim	Final	Q #1* search (% look left-right-left) Base	Interim	Final
K	243	156	166	6%	8%	6%	4%	17%	24%
1	251	219	127	5	5	16	6	24	44
2	179	144	165	1	7	4	5	38	37
3	229	168	174	6	6	21	14	46	67
4	220	187	160	5	5	6	7	33	59
5	203	148	101	4	3	10	8	42	49
6	238	154	124	6	8	9	8	38	55

Grade	Q #2* (% stop edge parked car)			Q #2* (% look left-right-left)			Q #3* (% let car pass and look left-right-left)		
K	3%	22%	31%	1%	13%	22%	1%	8%	9%
1	5	37	52	4	21	43	1	9	26
2	20	57	53	2	31	33	4	18	24
3	12	57	79	6	35	63	6	17	51
4	13	58	56	5	29	48	4	22	39
5	8	54	59	5	34	35	1	21	34
6	22	62	71	6	32	57	5	20	51

* [Base = L.A. 1/2 base + L.A. 1/2 interim + Columbus base + Mil. base] /3

[Interim = L.A. final = Columbus interim = Mil. interim] /3

[Final = L.A. post + Columbus Final + Mil. Final] /3

IV. STREET CROSSING BEHAVIOR

The previous chapters showed that the child dart and dash messages ("Willy" materials) were aired on television stations and shown to children in school. Moreover, the children remembered seeing the materials and demonstrated a substantial gain in safe street crossing knowledge. The present chapter will examine whether or not these knowledge gains were translated into safer street crossing behaviors. All data were collected using unobtrusive observers viewing naturally occurring child street crossings. Observations were conducted coincident with the knowledge measures in all three cities. The results indicated that children crossed more safely following exposure to the Willy materials.

A. Method

All data collection procedures were instituted identically, to the extent possible, in Los Angeles, Columbus and Milwaukee. Each data collection wave, pre, interim or final (and the extra "post" wave in Los Angeles), required approximately two weeks to complete and was conducted coincident with the in-school interviews discussed in the previous section. This schedule, shown in the previous section, is repeated below:

Measurement Wave	Los Angeles	Columbus	Milwaukee
Baseline	Jan. 1976	Jan. 1976	Feb. 1977
Interim*	May 1976	Nov. 1977	Nov. 1977
Final	May 1977	May 1977	May 1978
Post	May 1978		

The behaviors of interest and the observation format were similar to that utilized during the pre-test of the child dart and dash messages (Blomberg and Preusser, 1975). Specifically, course negotiation at the curb or at the edge of a parked car for crossings between parked cars, was rated on a one to five scale, defined to the observers as follows:

5 = full stop (child stops all forward motion for approximately one full second prior to entering the traveled portion of the roadway--definitely long enough to allow for an adequate search)

4 = pause or momentary stop (less than a full stop)

3 = hesitation (child breaks stride before entering the traveled portion of the roadway but does not stop or pause)

2 = slows (child does not break stride but does slow down)

1 = no change (child continues at the same pace as he/she enters the traveled portion of the roadway)

*As referenced in the last chapter, materials distribution in Los Angeles began very slowly, thus the interim measure was essentially a second baseline, the final measure more closely resembled interim in the other cities, etc.

It was found in this study that this scale could be learned quickly by observers and could be applied accurately and reliably.

Search behavior was also rated on a one to five scale. This scale was similar to the one used during the pre-test of these messages, and was defined to the observers as follows:

5 = LRL (child conducts the full left-right-left search)

4 = RLR, LR or RL (child at least searches in both directions)

3 = L (child looks to the left only)

2 = R (child looks to the right only)

1 = none (child does not search)

Again, as with the rating of course behavior, the search scale was learned easily by observers and could be applied accurately.

The data collection form for these two scales is shown in Figure 3. The information requested covers stopping at the curb, looking left-right-left, and stopping at the edge of a parked car. Observers were asked to scale course <u>and</u> search behavior for each child crossing directly within their field of view. The search scale value was placed in the column labeled "search" and the course scale value was placed in the column labeled "midblock course no parked car," "midblock course parked car," or "intersection course," depending upon where the crossing occurred. Child sex was noted in the far right columns. Header information included date, time and weather conditions. A child pedestrian was defined as any pedestrian who appeared to be approximately twelve years old or younger. However, if the observer was in doubt as to whether the child was twelve, thirteen or fourteen, the behavior was tabulated. Twelve was selected as the cut-off age since observations were at elementary schools which included children 12 and under and, although the messages were targeted primarily for 5-9 year olds, they should also impact slightly older children and the materials were available in their classrooms. Further, accident data available at that time indicated that approximately 13% of dart and dash crashes involve children in the 10-14 age range. The complete set of instructions provided to each observer is shown in Appendix A. The time of day, day of week and location for these observations are discussed below.

The sampling plan for these observations was structured during the Fall of 1975. At that time, data on child dart and dash crashes were available from the work of Snyder and Knoblauch (1971) and the then ongoing NHTSA/FHWA Data Base project of Knoblauch and Knoblauch (1976). These results showed that child dart and dash crashes typically occurred in the late afternoon (approximately 50% between 3-6 P.M.) on weekdays (approximately 80%) and in residential neighborhoods (approximately 75%). This pattern of accident occurrence, which has generally held in accident data collected since 1975, suggested that observations should be conducted in the hours immediately after school dismissal. The objective of the sampling procedure was to observe as many different children as possible at times and places where the behavior of interest occurred naturally. The accident data clearly

Dunlap and Associates, Inc.
Project #106

Page No. ______

Date ____________________

Observer ____________________

School ____________________

Location ____________________

____

Start Time ____________________

End Time ____________________

Weather was: (check one)

clear or cloudy ___

fog or drizzle ___

rain ___

snow or freezing rain ___

Codes: (for child actions within 2 feet of curb or edge of parked car)

Course

5 = full stop
4 = pause, momentary stop
3 = hesitate
2 = slows
1 = no change

Search

5 = LRL
4 = RLR - LR - RL
3 = L
2 = R
1 = None

Course			Search	Sex (Check One)	
Mid-block No Cars	Mid-block Cars	Inter-section		Male	Female

Figure 3. Data Collection Form for Dart and Dash Behavioral Observations.

suggested that the behavior occurred in residential neighborhoods, after school, on weekdays. Thus, the elementary schools in the target cities were used to structure the sampling procedure. Further, since it was desirable to observe as many different children as possible, several different streets around the schools were utilized each for only short periods of time.

Given these requirements, sampling was structured in the following manner:

- All elementary schools within the city were tabulated by school and enrollment.

- Schools were random probability sampled with replacement on the basis of enrollment such that a representative sample of the city was obtained.

- Each school entering the sample was assigned one observer for one three-hour period. The observer was located on a major pedestrian artery leading from the school for one half hour prior to the afternoon school dismissal to one half hour following dismissal. The observer then moved to a nearby street with moderate to heavy child pedestrian activity for the next half hour. The observer moved to a third location, etc., until the completion of three observation hours. All locations were urban-residential in character and did not involve crossing guards, traffic lights or pedestrian walk signals. Observers were situated so as to maximize the total number of crossings and the number of midblock crossings they could observe. The hours of observation were typically from 2:30 p.m. to 5:30 p.m., depending on the exact dismissal time.

The probability sample consisted of 50 schools in each city (some schools entering more than once). Each school was observed for one three-hour period on one weekday. Since the observer assigned to a given school was located on several different streets, a total of nearly 200 observer locations spread throughout the residential areas of each city were sampled. Scheduling was designed so that five observers in each city could observe at all 50 schools within two weeks. One or two additional observers were trained as alternates in each city. In general, a school that entered the sample twice was done by the same observer on two separate days. Observation locations for the second day were entirely different from the first day. Local principals and teachers generally did not know that observations were taking place after school hours. They certainly did not know when or where their children would be observed. The observation schedule was known only to the observers and school officials at the City's central office.

Every effort was made to ensure that each succeeding wave of observation was performed identically to the baseline measure. At baseline, observers were instructed to note the time they arrived at and left each specific location and draw a map showing where they stood and their field of view. Insofar as possible, the same observer was assigned to the same school, on the same day of week during each succeeding wave. And, using the baseline map and schedule, the observer was to replicate baseline as closely as possible. Changes were allowed to accommodate any variation in school dismissal schedules or radical alterations in the roadway such as the posting of a crossing guard or the installation of a traffic signal.

This design was implemented in Los Angeles, Columbus and Milwaukee. In Los Angeles, the observers were a mixture of college students, housewives and staff people from Dunlap's Western Division. Turnover of observers across the four measurements was moderately high. Ten schools had the same observer all the time, 15 were never observed by the same person more than once and the remaining 25 had some repeat observations by the same person. In Columbus, the observers were primarily college students. Turnover was high due to the one and one half years between the baseline and interim measures. In fact, no school was observed by the same person during all three measurements, though 26 schools did have some repeats. In Milwaukee, observers were recruited from the city's Parent-Teachers Association. Turnover was very low with 34 schools having the same observer for all three measurements and 15 of the remaining 16 having some repeats. Observer training and practice sessions were conducted in each city prior to commencement of each measurement wave. The sessions consisted of group training followed by practice to criterion wherein each observer rated several mock crossings until the scales were being reliably applied.

Obviously, the reliability of the observations is of concern when interpreting the results which follow. Unfortunately, within the context of this design, there are several different reliability factors which must be considered. First, it is reasonable to ask whether two observers viewing the same child crossing will produce the same scores on the "course" and "search" measurement scales described above. Based on the experience of the training to criterion sessions conducted for the observers, the answer to this question appears to be strongly positive. Second, it is reasonable to ask if individual observers are consistent or reliable over time as they observe children in different neighborhoods and across three or four waves of measurement. Third, can a second observer go back to the same school, retrace the schedule and locations of the first observer and generate a similar distribution of scores? Fourth, what is the stability of crossing behavior over time as between Winter and Spring?

While it was not possible to address each one of these questions individually, it was possible to generate reliability estimates which were aggregates across all of these potential sources of inconsistency. Specifically, the Los Angeles interim measure (May, 1976) could be viewed as essentially a replication of the Los Angeles baseline measure (January, 1976) since it is now known that very little materials distribution was accomplished in Los Angeles between the two measures. Therefore, the two measures should have produced equivalent results for each of the 50 schools as well as overall. As shown below, the overall distributions were remarkably similar:

Los Angeles

Course	Base	Interim	Search	Base	Interim
1. No change	45%	46%	1. None	35%	35%
2. Slowed	14	15	2. Right	18	19
3. Hesitated	9	11	3. Left	24	23
4. Paused	12	10	4. RLR,LR,RL	17	18
5. Full stop	20	17	5. LRL	5	6
N =	4,112	4,387		4,096	4,385

Baseline and interim "course" score distributions were correlated for each of the 50 sites or schools. The average or mean correlation across the 50 schools was +.886 (correlations were transformed to z-scores, averaged, transformed back to r values). The average for only those 27 schools having the same observer, baseline and interim, was +.900. Similarly, correlations for the "search" scale distributions averaged +.782; and the average for only those 27 schools having the same observer was +.818. These figures suggest that both the course and search scales can be reliably applied by observers, the procedures can be reliably applied and that the behavior of interest (without intervention by the Willy program) is relatively stable. In other words, the observation procedures do appear to be reliable, at least in Los Angeles, across the combined effects of changes in time, observer and season of the year.

B. Baseline Behavior

Table 11 provides an overview of the baseline data collected in all three cities. These data are presented here to provide a basic picture of child crossing behavior. While this study was not specifically designed to examine child crossing behavior in general, baseline results nevertheless do provide some insights on the overall child pedestrian accident problem. In particular, it was found that children are very poor street crossers. Few stop before entering the roadway, few look both ways and only about 9% stop and look both ways before crossing.

The first result of interest in Table 11 is the number of male versus the number of female children observed. The percentage of male children ranged from 58% to 61% across the three cities during the baseline measurement wave. Further, as the distributions in the Table show, male children cross less safely that female children with respect to both "course" behavior and "search" behavior. Taken together, these findings are clearly consistent with child pedestrian accident data which generally show 60% to 70% male involvement. Thus, male children appear to be more at risk than female children because they make more crossings and because their crossings seem to be less safely executed when measured by the search and course scales used in this study.

The last data array in Table 11 shows child search behavior as a function of child course behavior. The results show that the two are highly correlated (contingency coefficients ranged from .51 to .57 across the three cities) and both behaviors are very bad. Only 18% of the children looked both ways before entering the roadway and only 16% of the children came to a full stop. Only about 9% came to a full stop and looked both ways. This behavior might have been understandable, though still unsafe, if it had occurred in the presence of a crossing guard or possibly a pedestrian walk signal. However, observers were specifically instructed not to observe children crossing with a crossing guard or at a signalized location. Therefore, these are what might be referred to as "unaided" crossings, and these results clearly show that child "unaided" crossings behavior is abysmal. In fact, based on these results, it is remarkable that there are not many more children struck by motor vehicles.

Table 11. Baseline Behavior Descriptions (All Three Cities).

	N	No Change	Slow	Course Hesitate	Pause	Full Stop
Male	5,213	60%	12%	6%	8%	14%
Female	3,527	48%	13%	8%	11%	20%

		Search: None	Right (only)	Left (only)	RL; RLR LR	LRL
Male	5,195	46%	18%	20%	13%	4%
Female	3,513	38%	20%	21%	16%	5%

		Crossing Location: Midblock	Intersection
Male	5,185	34%	66%
Female	3,499	28%	72%

Search	No Change	Slow	Course Hesitate	Pause	Full Stop	Total
None	36.3%	2.9%	1.3%	1.2%	1.1%	42.8%
Right (only)	8.1	3.8	2.3	2.0	2.8	18.9
Left (only)	8.4	3.4	2.0	2.6	3.8	20.2
RL, RLR, LR	2.0	2.1	1.4	2.8	5.5	13.8
LRL	0.3	0.3	0.2	0.4	3.1	4.2
TOTAL	55.1%	12.4%	7.1%	9.0%	16.3%	100.0%

N = 8,744

C. Results

The primary evaluation data for child on street behaviors are shown in Tables 12, 13 and 14 for the three cities. As shown in the tables, all of these distributions; course and search, midblock, intersection and total; Los Angeles, Columbus and Milwaukee are statistically significant to at least the .001 level. In other words, in all cases, course and search behavior as recorded by the observers changed significantly over the period of this study. Los Angeles showed positive changes in search behavior while the results for course behavior were "mixed." The Columbus results showed an improvement in search behavior but only for the interim measure while course behavior results were also "mixed." Milwaukee, on the other hand, showed strong positive results for both course and search behavior. The following paragraphs discuss these findings.

The Los Angeles data, shown in Table 12 were taken at four different times or waves during this study. As discussed earlier, the first two of the waves, "baseline" and "interim," were both really baseline measures. The next wave, "final," occurred at about the peak of the campaign and the last or "post" measure was taken at a time when the campaign was nearing completion. The first set of data shown cover course behavior at midblock locations. The results suggest a marked improvement during the final measure as compared to baseline (51% "no change" down to 35% and 10% "full stop" up to 16%). However, this improvement did not hold through the time of the post measure. The second set of data covers course behavior at intersections. These results can only be described as "mixed" since there were decreases both in the very unsafe category of "no change" and in the very safe category of "full stop." The third set of data simply provides a summary of midblock and intersection crossings. The fourth set of data shows search behavior at midblock locations. The data show clear improvement from the baseline to the final measure (5% look left-right-left to 11% and 21% look both ways to 35%). However, as with midblock course behavior, midblock search behavior also drops back toward baseline during the "post" measure. The next set of data shows intersection search behavior. Again, there is a large improvement from the baseline to the final measure, but here there is little or no dropping back to baseline during the post measure. The final data set simply provides a summary of Los Angeles midblock and intersection search behavior.

The Columbus observation data are shown in Table 13. The first set of data, covering midblock course behavior, show some improvement between the baseline and interim measures followed by a sharp drop in the final measure. Results at intersections, shown in the next data set, were "mixed." As in Los Angeles, there were decreases in both the very unsafe category (45% to 39%) and in the very safe category (18% to 13%) between the baseline and interim measures. The third data set simply shows the sum of midblock and intersection crossings. The next two data sets show midblock and intersection search behavior. Both data sets show strong gains between the baseline and post measures, followed by a sharp drop during the final measure. The last data set shows the sum of midblock and intersection search behavior.

The Milwaukee behavioral observation data are shown in Table 14. These results, more than either of the other two cities, show strong positive gains midblock and intersection, course and search. The first set of data cover midblock course behavior. Here, there was a steady improvement from the

Table 12. Distribution of Course and Search Behavior for Los Angeles.

Location	Wave	N	Course: No Change	Slow	Hesitate	Pause	Full Stop	χ^2
Midblock								
	Base	1182	51%	17%	10%	11%	10%	113.76
	Interim	984	48	17	11	12	11	df=12
	Final	1172	35	18	13	18	16	p<.001
	Post	874	55	13	12	10	11	
Intersection								
	Base	2918	43%	13%	8%	12%	25%	348.66
	Interim	3355	46	14	11	10	19	df=12
	Final	4520	36	16	14	17	17	p<.001
	Post	3592	36	19	15	14	17	
Total								
	Base	4112	45%	14%	9%	12%	20%	330.93
	Interim	4387	46	15	11	10	17	df=12
	Final	5692	36	17	14	17	17	p<.001
	Post	4466	40	18	14	13	16	
			Search: None	**R**	**L**	**RL RLR LR**	**LRL**	
Midblock								
	Base	1181	35%	20%	25%	16%	5%	106.12
	Interim	984	34	17	24	21	4	df=12
	Final	1172	27	16	22	24	11	p<.001
	Post	874	33	20	24	16	7	
Intersection								
	Base	2903	35%	17%	24%	18%	6%	244.67
	Interim	3353	35	19	23	17	7	df=12
	Final	4519	30	18	19	21	12	p<.001
	Post	3592	24	21	23	20	12	
Total								
	Base	4096	35%	18%	24%	17%	5%	300.31
	Interim	4365	35	19	23	18	6	df=12
	Final	5740	29	18	20	22	12	p<.001
	Post	4466	26	21	23	19	11	

Table 13. Distribution of Course and Search Behavior for Columbus.

Location	Wave	N	Course: No Change	Slow	Hesitate	Pause	Full Stop	χ^2
Midblock								
	Base	473	50%	19%	9%	11%	11%	62.06
	Interim	814	42	18	16	13	11	df=8
	Final	479	62	14	12	5	8	p<.001
Intersection								
	Base	674	45%	19%	11%	7%	18%	33.40
	Interim	692	39	18	17	13	13	df=8
	Final	647	44	14	17	10	16	p<.001
Total								
	Base	1148	47%	19%	10%	9%	15%	66.39
	Interim	1506	41	18	17	13	12	df=8
	Final	1126	51	14	15	8	12	p<.001
			Search: None	**R**	**L**	**RL RLR LR**	**LRL**	
Midblock								
	Base	474	46%	18%	16%	14%	6%	80.32
	Interim	814	29	21	26	18	7	df=8
	Final	479	51	17	17	10	5	p<.001
Intersection								
	Base	674	40%	16%	18%	20%	4%	57.75
	Interim	692	27	21	23	21	8	df=8
	Final	647	40	18	20	12	9	p<.001
Total								
	Base	1148	43%	17%	18%	18%	5%	117.19
	Interim	1506	28	21	25	19	8	df=8
	Final	1126	45	17	19	12	7	p<.001

Table 14. Distribution of Course and Search Behavior for Milwaukee.

Location	Wave	N	No Change	Slow	Hesitate	Pause	Full Stop	X^2
			Course					
Midblock								
	Base	1105	82%	7%	3%	3%	5%	36.57
	Interim	699	81	7	2	3	6	df=8
	Final	867	73	7	5	6	9	p<.001
Intersection								
	Base	2370	64%	9%	5%	7%	15%	56.11
	Interim	1434	56	10	5	9	20	df=8
	Final	1394	55	9	4	9	23	p<.001
Total								
	Base	3520	69%	9%	4%	6%	12%	53.46
	Interim	2133	64	9	4	7	16	df=8
	Final	2261	62	8	5	8	17	p<.001
			Search					
			None	R	L	RL RLR LR	LRL	
Midblock								
	Base	1091	64%	20%	11%	4%	1%	89.37
	Interim	699	65	15	12	6	2	df=8
	Final	867	54	14	16	12	4	p<.001
Intersection								
	Base	2366	47%	21%	19%	10%	3%	187.37
	Interim	1434	44	19	20	12	5	df=8
	Final	1394	37	17	18	16	12	p<.001
Total								
	Base	3502	52%	20%	16%	9%	3%	206.68
	Interim	2133	51	17	18	10	4	df=8
	Final	2261	43	16	17	15	9	p<.001

baseline to the final measure (5% "full stop" to 9% and 82% "no change" down to 73%). Similarly, course behavior at intersections also showed steady improvement (15% "full stop" to 23% and 64% "no change" down to 55%). The third set of data shows the sum of midblock and intersection course behavior. The fourth set of data shows midblock search behavior. Again, these results show generally steady improvement from the baseline to the final measure (5% at least look both ways to 16%). The next set of data shows intersection search behavior and again there is steady improvement (13% at least look both ways to 28%). The last set of data provide the sum of midblock and intersection search behavior.

In summary, the behavioral observation data show some positive changes consistent with the type but not necessarily the magnitude of the knowledge gains reported in the last chapter. Milwaukee showed the largest gains followed by Los Angeles with mixed results from Columbus. Further, the Milwaukee gains appeared to hold or increase through the final wave of measurement while other gains, particularly in Columbus, were less persistent. Gains were observed both for midblock and intersection crossings. Gains were observed both for course and for search behavior though the search gains tended to be larger and more consistent. The superiority of Milwaukee and the generally greater effects with search behavior are consistent with the knowledge results. However, there was no basis for deriving a direct relationship between knowledge gain and measured behavior because of the varying metrics employed. It was concluded that the Willy Materials did have a significant positive effect on the safety of naturally occurring child street crossings.

V. ACCIDENT REDUCTION

Previous chapters of this report showed that the children were exposed to the Willy materials, their knowledge of safe street crossing behavior improved and their actual, naturally occurring, street crossing behaviors were safer. Results were strongest in Milwaukee. However, knowledge gain and positive behavioral change are only intermediate objectives of this study. The ultimate objective, and the focus of this chapter, is accident reduction. Clearly, the knowledge and behavioral results suggest that an accident reduction should have been achieved. The following paragraphs will describe how relevant accident data were accessed, coded and processed. The results will show that the number of child accidents of the types addressed by the Willy materials, were reduced.

The analyses which follow are based on two very different types of data. First, and most important, pedestrian accident reports for each city were accessed, read and coded with respect to "accident type." Second, statewide data were obtained (computer processing only) to examine overall trends in child pedestrian accidents both in areas surrounding the test cities and in distant areas of each state. The surrounding and/or suburban areas of each test city were particularly interesting since these communities should have been exposed to the televised messages but not the in-school materials.

As discussed earlier, the Willy materials were designed to reduce midblock dart and dash accidents among young children. The dart and dash accident types of interest were (from Knoblauch, 1975):

- Dart-Out, First Half--Midblock, short time exposure (to the driver), crossed less than halfway
- Dart-Out, Second Half--Same as above except crossed more than halfway
- Midblock Dash--Not at intersection, pedestrian running (but the short time exposure required for Dart out First or Dart out Second could not be documented)

Concerning child age, the messages were targeted for young children attending elementary school, though the televised spots were expected to have some impact on slightly younger and slightly older children. Thus, the age range of primary interest was approximately 4 or 5 years to about 9 or 10 years of age.

A positive impact of the Willy materials would be evidenced by an overall reduction in child pedestrian accidents. This reduction should be greatest among the midblock dart and dash type events involving children in the age range of 5-9. Obviously, reduction should be greatest in the test cities though some effects may be seen in surrounding suburban communities. Also, reductions should be greatest among English-speaking children since the Willy materials were only produced in English. Lastly, reductions should be related in time to the exposure of the Willy materials. The results which follow will show support for each one of these statements with the strongest evidence for reduction of darts and dashes among young children particularly in Milwaukee and Los Angeles.

The data presented below are based on police accident reports from the three cities and the three states involved. Obviously, the process of police investigation of crashes, preparing reports, processing reports, etc., can become quite complex particularly when the number of pedestrian crashes within the three states over the time period of interest totals tens of thousands. For this reason, relatively elaborate procedures were utilized to access these reports. Furthermore, in each of the three test locations, access was accomplished through two separate and largely independent mechanisms. First, hard-copy accident reports were obtained, read and coded by project staff. This was accomplished with the cooperation of the three cities. Second, computer records of pedestrian crashes were obtained from each state. The next three sections of this Chapter detail the procedures utilized in Los Angeles, Columbus and Milwaukee respectively. Results relative to reduction of child accidents appear in the fourth section.

A. Method--California

Both the City of Los Angeles and the State of California maintain hard-copy and computerized files of pedestrian accidents in Los Angeles. While the two separate systems are similar, they differ with respect to off-road crashes and crashes investigated by the California Highway Patrol. Off-road crashes are held in the Los Angeles system, but were excluded from the State system beginning in 1977. Crashes investigated by the California Highway Patrol (essentially freeway events) are held by the State system but not by the City.

1. Access and Coding for Los Angeles Files

Officials of the Los Angeles Police Department (LAPD) were approached during late 1975 and early 1976 as to the possibility of accessing pedestrian accident data held by the City. As a result of these discussions, Los Angeles provided to Dunlap a listing of all crashes which involved a collision with a pedestrian. The accident report number for each case with identified pedestrian involvement was printed and the full list of all such crashes was provided to records personnel of LAPD. These individuals pulled each report from the files and made them available to Dunlap personnel for reading and coding at LAPD headquarters. Coding was accomplished during a ten day period by six individuals--three senior staff members familiar with pedestrian accident coding and three assistants locally recruited and trained. This coding effort took place during the late Spring of 1976 and provided the Los Angeles baseline data.

The original plan called for a replication of this access and coding strategy to provide accident data for the period 1976-1978 covering the test of the child messages. Unfortunately, the computer tape obtained from Los Angeles for this period indicated many accident report numbers for which no information was entered. This problem necessitated the manual screening of all reports for which information was not keypunched. Reports whose computer records existed and showed only involved vehicles (no pedestrians) were excluded. All other reports--those for which no computer records existed ("unidentifieds") or whose computer records referenced pedestrians--were manually screened and those with actual pedestrian involvement were read and coded if they involved a pedestrian.

This procedure accessed a more complete set of pedestrian accident reports than had been reviewed in the baseline coding. In particular, the earlier coding had not searched reports for which no computer records existed or those which involved a secondary pedestrian, as in cases when a car hits another car, leaves the roadway, and then strikes a pedestrian. To make the accident tabulations comparable from 1973 through 1978, the "overlooked" pedestrian accidents from 1973-1975 were similarly accessed and coded in this second coding wave.

Coding for the 1976-1978 period was accomplished during the late Spring of 1979 by the same six individuals each coding roughly the same proportion of reports as during the baseline coding effort. In addition, a fourth senior coder participated. This seventh individual (fourth senior coder) coded most of the secondary involvements, 1973-1975 and 1976-1978; most of the pedestrian "unidentifieds" from 1973-1975; and an equivalent number of "unidentifieds" from 1976-1978. The remaining "unidentifieds" and secondary involvements were distributed across the other senior coders. This coding effort was monitored, insofar as possible, to ensure that each of the seven coders read and coded an equivalent proportion, baseline (1973-1975) to program (1976-1978), of "involved with pedestrian," "unidentified" and "secondary impact" reports. While proportions varied markedly among individual coders, it was generally true each coder did approximately the same proportion of each type of report for the baseline and program periods.

The first step in the coding of any report was a determination of whether or not the event represented a pedestrian/motor vehicle crash. For the purposes of this study, the following definitions were adopted:

- Pedestrian Victim - Any person involved in a motor vehicle accident who was not in or upon a motor vehicle or bicycle or tricycle in transit and whose injuries did not result from falling from a motor vehicle.

- Motor Vehicle Accident - Any accident involving a motor vehicle in transport. That is, in motion, in readiness for motion or on a roadway, but not parked.

Specifically included in this study were individuals riding skateboards, carts, wagons, etc., when involved in a motor vehicle accident. Also included were off-road events where the involved vehicle was in "transport," situations involving debris falling from or propelled by a motor vehicle, as well as situations in which the motor vehicle hit a building and people inside the building were injured. Specifically excluded were bicycle riders, tricycle riders and individuals whose injuries resulted solely from falling from a motor vehicle as opposed to being struck by a motor vehicle.

The coding format utilized for the Los Angeles accident data is shown in Figure 4. Second and third pedestrians for the same crash were coded by changing the card number (shown as "1" in the Figure) to "9" and completing the appropriate information for each additional pedestrian. The first pedestrian coded in a multiple pedestrian crash was taken as the "lead"

DUNLAP AND ASSOCIATES, INC. - Project 106

Los Angeles Pedestrian Accident Coding Form

Keypunched ☐

Card Number ☐1 (1)

City ☐0☐9 (2-3)

DRIVER SPANISH SURNAME . . . . 1. yes; 2. no; 3. ? . . . . ☐ (9)

PEDESTRIAN SPANISH SURNAME . . . . . 1. yes; 2. no; 3. ? . . . . ☐ (10)

DATE . . . . month/day/year . . . . ☐☐☐☐☐☐ (11-16)

TIME . . . . ☐☐☐☐ (18-21)

DRIVER AGE . . . . ☐☐ (23-24)

DRIVER SEX . . . . . 1. m; 2. f; 3. h&r; 4. h&rM; 5.h&rF . . . . ☐ (25)

PEDESTRIAN AGE . . . . ☐☐ (26-27)

PEDESTRIAN SEX . . 1. m; 2. f . . . . ☐ (28)

INJURY SEVERITY . . 1. K; 2. A; 3. B; 4. C; 5. none . . . . ☐ (30)

LIGHTING . . . . ☐ (31)

WEATHER CONDITIONS . . . . ☐ (32)

ROAD CONDITIONS . . . . ☐ (33)

VEHICLE TYPE . . . 1. car; 2. taxi; 3. bus; 4. truck; 5. other . . . . ☐ (34)

TYPE OF ROAD . . . 1. two-way; 2. one-way; 3. divided; 4. expressway; 5. other . . ☐ (35)

TRAFFIC CONTROL . 1. RGA; 2. stop/yield; 3. none; 4. other . . . . ☐ (37)

VEHICLE ACTION . . . . ☐☐ (39-40)

ACCIDENT OCCURRED . . . . 1. intersection; 2. not at intersection . . . . ☐ (41)

. . . 1. in marked crosswalk; 2. in unmarked crosswalk; 3. not in crosswalk . . ☐ (42)

ACCIDENT TYPE . . . ☐☐ (76-77)

01 DO1	10 Weird
02 DO2	11 Dis V
03 ID	12 A-A
04 VTM	13 Mid
05 PStV	14 Trap
06 MT	15 Turn V
07 Bus	16 PNR
08 Bk	17 Other
09 Vend	18 NC

CULPABILITY . . . . . 1. driver; 2. pedestrian; 3. both; 4. neither . . . . ☐ (78)

SECOND ACCIDENT TYPE . . . . ☐ (79)

1 Non Ped AR (not 7)	6 PNA
2 Start gun	7 Rd Wk Site
3 FE cross	8 RTR left
4 Ped exit	9 RTR right
5 Ped walk	0 RTR across

CODER . . . . ☐ (80)

Figure 4. Los Angeles Accident Coding Form

pedestrian in a group or, if none, the first pedestrian struck, or if unknown, the most seriously injured, or if equal, the first pedestrian coded by the officer. The first vehicle coded, with its driver, was taken as the striking vehicle unless that vehicle was not in transport (e.g., parked car). Most of the data coded were lifted directly, without change, from the police accident report. Driver and Pedestrian Spanish surnames were judged based on the names of the parties and the officer's designation of "descent." "Type of Road," "Traffic Control," "Intersection" and "Crosswalk" were also judged by the coder. A crash was coded as an intersection event if either or both parties, immediately prior to the crash, were influenced by or should have been influenced by the rights, duties, controls, etc., associated with an intersection. In practice, crashes occurring within an intersection or any of its marked or unmarked crosswalks were coded as intersection events. Similarly, crashes occurring just outside the intersection or involving a pedestrian path which did or would have contacted any part of the intersection were also coded as intersection events. Beyond this was a gray area from about 15 or 20 feet outside the intersection to as far as about 50 feet. These events were coded as "intersection" if, in the judgement of the coder, the intersection and/or its controls influenced either or both parties immediately prior to the crash. For example, the pedestrian may have referenced watching and following the pedestrian signals at the intersection even though clearly outside a defined crosswalk. Similarly, the judgement of "Traffic Control" followed the intersection judgement and was often dependent on it. "Crosswalk," marked or unmarked, was coded if the pedestrian was hit while in a crosswalk.

The next, and in many ways the most important, judgmental code was for "Accident Type." The specific types and their definitions were taken directly from the work of Knoblauch (1975). These definitions are reproduced in Table 15. As discussed elsewhere, the Willy materials were designed to impact Dart-Out First Half, Dart-Out Second Half and Midblock Dash accidents involving children. As seen in their definitions, these three types are very similar. Dart-Out First and Dart-Out Second differ only with respect to how far the pedestrian went into the street prior to being struck. Typically, though not necessarily, this further implies that a first half event involved a vehicle coming from the left while a second half event involved a vehicle coming from the right. Midblock Dash may involve a first or second half event. It can normally be thought of as a surrogate for Dart-Out First or Dart-Out Second in those cases for which "short-time exposure" could not be documented from the police accident report yet it was known that the pedestrian was running.

Obviously, there is both a certain amount of overlap and similarity among these accident type definitions as well as a hierarchical structure relating one to the other. Consider, for instance, the situation where a child is struck while running out from in front of an ice cream truck parked in a midblock location. This event might be considered as a Midblock Dash, however, short-time exposure can probably be documented thus the "higher" accident type Dart-Out First (or Second) is more appropriate. Moreover, with the presence of the ice cream truck, the still "higher" Vendor accident type is appropriate and would be coded. Similarly, the typical Multiple Threat accident is also an Intersection Dash or Dart-Out and the typical Backing accident may also be Ped Not in Road. Therefore, some precedence or ordering of the accident types had to be established to allow for consistent coding. The precedence established for the purposes of this effort was as follows:

Table 15. Accident Type Definitions

Symbol	Code #	Definition
DO1	01	DART-OUT, FIRST HALF: Midblock, short-time exposure, crossed less than halfway
DO2	02	DART-OUT, SECOND HALF: Same as 01 except, crossed more than halfway
ID	03	INTERSECTION DASH: At intersection, short time exposure or running
VTM	04	VEHICLE TURN/MERGE WITH ATTENTION CONFLICT: Driver turning and attending to traffic, not pedestrian
PStV	05	PED STRIKES VEHICLE: Ped walked or ran into vehicle and not other type
MT	06	MULTIPLE THREAT: Ped struck by vehicle traveling in same direction as other cars that had stopped for ped
Bus	07	BUS STOP RELATED: Ped struck while crossing in front of bus standing at a bus stop
Bk	08	BACKING-UP: Ped struck by backing-up vehicle but ped not clearly aware of the vehicle movement
Vend	09	VENDOR--ICE CREAM TRUCK: Ped struck going to or from a vendor in a vehicle on the street
Weird	10	WEIRD: Unusual circumstances, not countermeasure corrective
DisV	11	DISABLED VEHICLE RELATED: Ped struck while working on or next to a disabled vehicle
A-A	12	RESULT OF AN AUTO-AUTO CRASH: Ped struck by vehicle(s) or debris as a result of an auto-auto or single vehicle accident (i.e., secondary impact
Mid	13	MIDBLOCK DASH: Not at intersection, ped running but not short-time exposure (i.e., not 01)
Trap	14	TRAPPED: At signalized intersection, ped hit when light changed and traffic started moving (not 06)
TurnV	15	TURNING VEHICLE: Ped struck by turning vehicle (not 04)
PNR	16	PED NOT IN ROADWAY: Ped struck while not in roadway, includes cases where vehicle went out of control (not 07, 08, 11, 12)
Other	17	OTHER: Defined situation as accident type not covered above (e.g., Rear Wheel Truck or Bus, Alphonse-Gaston, Gas Station Related, Rear-view Mirror, Hot Pursuit, Illegal or Anti-Social Act or any of the second Accident Types shown in Table 16).
NC	18	NOT CLASSIFIABLE: Insufficient data to permit a classification, or undefined situation (not 10)

Highest	-	Auto-Auto Backing Bus Stop Disabled Vehicle
Second	-	Ped Not in Road
Third	-	Multiple Threat Vendor Vehicle-Turn-Merge Turning Vehicle
Fourth	-	Dart-out First Dart-out Second Intersection Dash Trapped
Fifth	-	Midblock Dash
Sixth	-	Ped Strikes Vehicle
Seventh	-	Weird Other Not Classifiable

An accident event satisfying two or more accident type definitions was coded with the definition having the highest precedence.

The next judgment code (shown below Accident Type on Figure 4) was for Culpability. Culpability was not determined on legal grounds but rather in behavioral terms. It was defined as: "The commission of a behavioral error, the elimination of which would likely have resulted in crash avoidance." Judged culpability could have been assigned to the pedestrian, the driver, both or (in rare instances) neither.

The last coder judgment was for Second Accident Type. This judgment was added because certain special situations, not covered in the main accident type list, were of current interest. Table 16 provides the definitions for each of these second accident types. In general, any Second Accident Type could be coded in conjunction with any main Accident Type though there were certain logical relationships. The Right-Turn-On-Red types, for instance, were invariably Turning Vehicle or Vehicle Turn/Merge from the main list and many of the remaining Second Types were often associated with the "Other" category on the main list. Second Accident Type was coded only when the crash event satisfied one of the Second Accident Type definitions.

For the purposes of this study, coding of primary or main accident type was the most important single coder judgment. This is often a complicated judgment to make and each individual coder could be expected to have his or her own set of biases or idiosyncracies in approaching this task. As discussed earlier, the first defense against the possibility that coder bias might influence resulting distributions of accident type across the years of this study was to ensure that each coder coded an equivalent number of accident

Table 16. Second Accident Type Definitions

Symbol	Los Angeles	Milwaukee	Definition
Non Ped AR	1	1	NON-PEDESTRIAN ACTIVITY IN ROADWAY: (e.g., sleeping, laying down, etc.; but not other defined type)
Start Gun	2	n.a.	STARTING GUN or DRIVER TRAPPED: Driver enters intersection late, typically on an amber signal. Far side pedestrian leaves the curb immediately upon obtaining a green or walk signal
FE Exit	n.a.	2	FREEWAY/EXPRESSWAY EXITING: Pedestrian struck after or while exiting a vehicle on a freeway
FE Cross	3	3	FREEWAY/EXPRESSWAY CROSSING: Pedestrian struck while attempting to cross a freeway but not after exiting a vehicle
Ped Exit	4	4	PEDESTRIAN EXITING: Pedestrian hit while exiting a vehicle not on a freeway
Ped Walk	5	5	PEDESTRIAN WALKING IN ROADWAY: Pedestrian hit while walking in but not crossing a roadway not a freeway
PNA	6	6	PROBABLE NON-ACCIDENT: An intentional crash or Police judgment that no accident occurred
Rd Wk Site	7	n.a.	ROAD WORK SITE: Pedestrian hit while working on, over or under the roadway
School Bus	n.a.	7	SCHOOL BUS: The pedestrian is struck while going to or from a school bus or school bus stop
RTR Left	8	8	RIGHT TURN ON RED-LEFT: Pedestrian crossing from left to right in front of a driver turning right on red
RTR Right	9	9	RIGHT TURN ON RED-RIGHT: Pedestrian crossing right to left in front of a driver turning right on red
RTR Across	0	0	RIGHT TURN ON RED-ACROSS: Pedestrian crossing parallel to driver's original path before he made a right on red, i.e., ped struck crossing street driver turned into

reports from both the baseline period (1973-1975) and program period (1976-1978). In this way, any individual coder idiosyncracies would be equally represented in both periods. The actual percentages of reports coded, baseline (N=9,285) vs. program (N=10,098), for the senior coders were: 17% vs. 17%, 22% vs. 21%, 19% vs. 22% and, for the fourth senior coder added in the Spring of 1979, it was 10% vs. 10%. The comparable figures for the three junior coders were: 13% vs. 13%, 9% vs. 8% and 10% vs. 10%. Thus, there was essentially baseline versus program equivalence and the senior coders coded approximately 69% of the reports.

Of course, this "equivalence" only suggests that any error or bias is equivalently present in baseline and program periods. It is also of interest to estimate the size or magnitude of these potential idiosyncratic factors. In other words, it is of interest to estimate the reliability of the coding process relative to determination of accident type. One measure of this reliability is the correlation between the accident type distributions generated by the individual coders. While each coder read different reports, the set of reports read by each coder did represent, for the most part, a random sample of reports drawn from the same population of reports (i.e., all reported pedestrian crashes in Los Angeles, 1973-1978). Thus, if accident type determination was 100% reliable, each coder should have produced exactly the same distribution of accidents by type. This would not be true for the fourth senior coder whose sample of reports was selectively drawn, and all calculated correlations would be depressed due to sampling error associated with randomly drawing each coder's set of reports. Nevertheless, the correlations among coders, across the 18 possible accident type codes, are estimates of coding reliability. These correlations were computed by first converting the raw data to percentage distributions across accident type for each coder. These percentages were transformed using the arcsin transformation and product-moment correlations were calculated. Between the three junior coders, the intercorrelations were .76, .89 and .90. The three senior coders produced intercorrelations of .94, .95 and .99. Further, the correlation between the summed distribution for the three senior coders and the summed distribution for the three junior coders was .94. Clearly, accident type was coded from Los Angeles police accident reports with a relatively high degree of reliability.

2. <u>Access to California State Files</u>

The State of California maintains accident data files for the entire state. As mentioned above, they differ from the Los Angeles maintained files with respect to off-road crashes and crashes investigated by the California Highway Patrol. The main advantage of the State data was that they provided a data base which permitted comparisons beyond the City of Los Angeles.

State officials were approached during the Spring of 1980 and asked to provide computer-generated data tables from the State system. The specific request was for data showing pedestrian age (in single years of age) by month for each year 1973 to 1979 for various parts of the State. Southern California areas requested included Los Angeles, Los Angeles County, Orange County and the southern cities of San Diego, Riverside and Santa Barbara. Northern California areas included the larger cities of San Jose, Oakland and Sacramento as well as the smaller cities of Fremont, Fresno, Stockton and Sunnyvale. Data tables from San Francisco were requested but not utilized due to the fact that they were not complete and state officials advised that they contained certain problems. Requested data tables were received and analyzed. While there were no obvious problems or anomalies, these data could not be subjected to the extensive checks and crosschecks applied to Los Angeles City data.

B. Method--Ohio

Both the City of Columbus and the State of Ohio maintain hard-copy, microfiche and computerized pedestrian accident data files. Both City and State files were accessed for the purposes of this study.

1. Access and Coding for Columbus Files

Columbus was part of the NHTSA/FHWA Data Base system beginning in July of 1974. This Data Base and its associated data collection format has been described elsewhere (e.g., Knoblauch and Knoblauch, 1976). Essentially, the data items of interest from this data base are identical to the items shown in Figure 4 (Los Angeles Accident Coding Form) as the Los Angeles format was patterned directly from the NHTSA/FHWA forms. The only difference of interest was that the Columbus effort did not include coding for "Culpability" and "Second Accident Type." Columbus officials were approached in 1975 to determine how the data base could be extended backwards in time to produce a longer baseline period for the test of the child materials. It was agreed that Columbus personnel would scan the microfiche record for all traffic accidents from January 1973 through June 1974. Pedestrian crash involvements were identified, reports were copied and the copies were supplied for coding to BioTechnology, Inc., which was responsible for all accident coding performed in the Data Base effort.

The original plan was for the NHTSA/FHWA Data Base to provide this study with coded data for Columbus covering the years 1973 to 1978. These data were received and processed. However, crosschecks with other data sources revealed that they represented less than the total number of pedestrian crashes occurring in Columbus during this period. Columbus officials were again contacted and asked to scan their microfiche records for the period from July 1974 through all of 1978. Reports showing pedestrian involvement were identified and cross-referenced with the reports already provided to us from the Data Base. Reports not already in the Data Base were copied and forwarded to us for coding. The same four senior coders who participated in the Los Angeles effort coded those newly identified reports involving only adult (15 years or older) pedestrians. These coded reports were merged with the reports already provided by the Data Base.

Newly identified reports involving child pedestrians could have been handled in the same manner. However, the child reports were of particular interest since children were the target group for this study. Therefore, it was considered inappropriate to have some coded by Dunlap personnel while most were coded by Data Base personnel which would have been the result had the new reports simply been coded and merged. The procedure adopted was to merge the newly identified child hard-copy reports with the reports already in the Data Base files on a month by month basis. The 72 months from 1973 to 1978 were placed in a random sequence and the accident reports by month, were all assigned an accident type code by the four senior coders. In other words, all of the accident type designations analyzed in this project for

Columbus crashes involving children (0-14 years) were assigned by the senior coders using the accident type definitions shown in Table 16. Because of the high reliability estimates for Los Angeles and Milwaukee (reported below), reliability estimates for the Columbus effort were not calculated. However, they may be assumed to be comparable to the estimates obtained for the Los Angeles data and very comparable to the estimates reported below for Milwaukee.

2. Access to Ohio State Files

The State of Ohio maintains accident data files for the entire State. As in California, the main advantage of these files was that they provided a data base which permitted comparisons beyond the test City. However, also as in California, the main disadvantage was that State data was in computer format only and accident type determination from hard-copy was not possible.

State officials were approached during the Spring of 1980 and asked to provide copies of their accident tapes for the years 1974 to 1979. The tapes were processed to produce distributions of pedestrian accidents by major variables of interest. Analysis centered on accident frequency by pedestrian age across the baseline and program years. Separate distributions were generated for the City of Columbus, immediately surrounding Counties, fringe Counties which may have been influenced by Columbus media, other large Ohio cities (Cleveland, Cincinnati and Dayton), other urban areas and other rural areas. As in California, the Ohio State provided data were not subjected to the extensive crosschecking applied to the data from the test city (i.e., Columbus). The checks that were made revealed that the data from Akron and Toledo were not complete for the first half of 1974 and, thus, these two cities were dropped from further analysis. Also, there was a severe statewide data loss affecting the last four months of 1976. Otherwise, the data appeared complete and no other anomalies were found.

C. Method--Wisconsin

Accident files are maintained by both the City of Milwaukee and the State of Wisconsin. However, initial contacts with Milwaukee officials suggested that the most efficient mechanism for accessing Milwaukee hard-copy reports was through the State system. Therefore, both the Milwaukee hard-copy reports and the computer records for statewide pedestrian crashes came from State files.

1. Access and Coding for Milwaukee Reports

In 1977, Milwaukee officials requested, from the State files, copies of all Milwaukee pedestrian crashes involving a child (0-14 years) as well as copies of all pedestrian reports for which age was unknown for the period 1974-1976. These reports were identified by the State through their computer, accessed, copied and transmitted to Milwaukee. Milwaukee officials made the reports available to this project. This procedure was repeated in 1978 for 1977 crashes and again in 1979 for 1978 crashes.

All of the hard-copy reports obtained were coded by the four senior coders. As in Los Angeles (and Columbus) the first step in this process was to verify that the event was a pedestrian/vehicle crash as per the definitions presented earlier in the discussion of the Los Angeles coding. The coding format, objective codes and judgmental codes including accident type were essentially identical to those shown earlier in Figure 4 for Los Angeles. The only differences of consequence were the addition of a "Pedestrian Action" code found on the Wisconsin reports and the addition of "School Bus" on the Second Accident Type list (see Table 17). Coding was accomplished by the four senior coders working in the same room. More difficult coding decisions were offered for group discussion. Uncoded reports were placed in a single stack and taken, one at a time, from the stack for coding. In this way, reports were essentially assigned randomly to coders.

The Los Angeles intercorrelations between the three senior coders were extremely high. Nevertheless, it was still desirable for each coder to code an equivalent number of reports from the baseline versus program periods. In Milwaukee, the percentage of reports coded during the 1974 to 1976 baseline period (N=1,257) versus the 1977 to 1978 program period (N=721) for each of the four senior coders was: 23% vs. 23%, 28% vs. 25%, 21% vs. 24% and 27% vs. 28%. Thus, the percentage of reports coded by each coder was roughly equivalent between the baseline and program periods.

Of course, as in the Los Angeles data, this equivalence only suggests that any idiosyncratic factors which are coder specific were equally represented in baseline and program periods. There still remained the question of estimating the magnitude of such factors or, in other words, estimating the reliability of the Milwaukee coding process. Such estimates were obtained for accident type determinations in the same manner as was done for the Los Angeles data. Specifically, as in Los Angeles, each coder coded a random sample of reports drawn from the same population of reports (i.e., child crashes in Milwaukee 1974-1978). As such, each coder should have produced the same distribution of accidents by type plus or minus the sampling error associated with drawing the random sample of reports. Coding reliability was estimated by calculating the product-moment correlation between the accident type distributions generated by each coder. These distributions were expressed as percentages across the 18 allowable accident type codes and the percentages were transformed using the arcsin transformation. The resulting intercorrelation matrix was as follows:

		Senior Coder #			
		1	2	3	4
Senior Coder #	1	-	.97	.95	.97
	2	-	-	.96	.97
	3	-	-	-	.98
	4	-	-	-	-

Thus, accident type determination from the Milwaukee child accident reports appears to be a highly reliable process.

2. Access to Wisconsin State Files

The State of Wisconsin maintains accident data files for the entire State. As in California and Ohio, the main advantage of these computer files was that they provided a data base which permitted comparisons beyond the test city. Again, however, the main disadvantage was that they were in computer format only and accident type determination from hard-copy was not possible.

State officials were approached during the Spring of 1980 and asked to provide copies of their accident tapes for the years 1974 to 1979. The tapes were processed using our facilities and distributions of pedestrian accidents were generated. Analysis centered on accident frequency by pedestrian age across the baseline and program years. Separate distributions were generated for the City of Milwaukee, immediately surrounding Counties, fringe Counties which may have been influenced by Milwaukee media, other urban areas (e.g., Madison, Green Bay, LaCrosse) and other rural areas. As in the other states, there was no available mechanism for providing extensive crosschecks of the data. Nevertheless, the data appeared to be complete and no anomalies were uncovered.

D. Results

Accident data are obviously the most important aspect of this evaluation. For this reason, the presentation of these data will be relatively exhaustive. The first section or part of this presentation will provide an overview of the basic results from the detailed examination of the police accident reports. The second section will show the state-wide data. The third section will utilize state and city data and examine the statistical significance of the observed accident reductions as determined by time series analysis. The last section will summarize data from all three cities into an overall impact statement.

1. Detailed Data

The purpose of this section is to present the basic findings of this study as shown from the city-provided hard-copy accident reports. As discussed earlier, accident reports involving children were read and coded with respect to accident type and a variety of other information. The results showed that accidents involving children decreased and the decrease was greatest among the midblock darts and dashes.

Table 17 shows the distribution of accident type by pedestrian age for each of the three cities during their respective baseline periods. These distributions show the pattern of child accidents and define the problem that the Willy Whistle message program was designed to address. Simply, the primary accident problem for young children is the midblock darts and dashes. For children ages 0-4, 63%, 62% and 70% of their accidents in the three cities were of the Dart-Out First, Dart-Out Second or Midblock Dash accident types. For children ages 5-9, the midblock darts and dashes accounted for 54%, 58% and 48% of their accidents. Within these midblock events, Dart-Out First appears to be the major problem. However, distinctions among these three accident types are not always meaningful and often depend more on the amount of detail provided in the accident report than on any real differences in crash dynamics. Of the remaining accident types, Intersection Dash becomes a problem as the child gets older. Backing and Vendor are problems for very young children and Ped Not in Road is a problem for all children. However, none of these remaining accident types approach the level of problem posed by the midblock darts and dashes.

Table 18 shows the distribution of accidents by type and pedestrian age for the period following the introduction of the Willy program. As in the baseline period, Intersection Dash is a problem as the child gets older, Backing and Vendor are problems for very young children and Ped Not in

Table 17. Pedestrian Age by Accident Type, Baseline Distributions for All Three Cities

Accident Type	Los Angeles 73-75				Columbus 74-76				Milwaukee 74-76		
Ped Age =	0-4	5-9	10-14	15+	0-4	5-9	10-14	15+	0-4	5-9	10-14
N =	869	1,738	816	5,782	218	450	234	714	282	658	317
Dart-out First	42%	32%	12%	5%	32%	22%	18%	6%	32%	19%	13%
Dart-out Second	12	13	8	4	17	12	7	6	11	8	3
Midblock Dash	9	8	6	1	14	23	14	1	27	20	13
Total Midblock Darts and Dashes	63%	54%	26%	10%	62%	58%	38%	13%	70%	48%	29%
Intersection Dash	3%	13%	13%	9%	10%	17%	15%	15%	5%	16%	14%
VTM/Turn Vehicle	2	5	14	18	2	2	4	19	1	4	12
Multiple Threat	2	6	11	7	-	1	3	3	1	1	2
Bus Stop	-	-	1	1	-	-	1	1	-	1	7
Backing	7	2	2	6	6	1	2	3	3	1	2
Vendor	7	6	2	-	5	6	1	-	-	1	1
Ped not in Road	7	4	9	11	7	4	8	10	5	6	7
Auto-Auto	1	1	3	7	-	-	1	2	-	-	2
Disabled Vehicle	-	-	-	2	-	-	-	2	-	-	-
Trapped	-	1	2	1	-	-	-	1	-	-	-
Ped struck Vehicle	1	1	1	1	1	1	3	3	1	2	3
Weird	1	1	1	2	-	-	-	4	-	-	-
Other	2	4	8	15	4	4	12	n.a.	2	3	6
Not Classifiable	5	4	8	10	4	6	11	27	10	16	18
Total	100	100	100	100	100	100	100	100	100	100	100

Table 18. Pedestrian Age by Accident Type, Program Distributions for All Three Cities

Accident Type	Los Angeles '76-'78				Columbus '77-'78				Milwaukee '77-'78		
Ped Age =	0-4	5-9	10-14	15+	0-4	5-9	10-14	15+	0-4	5-9	10-14
N =	827	1,603	875	6,702	82	227	105	439	151	366	204
Dart-out First	37%	30%	9%	4%	41%	23%	15%	4%	37%	19%	9%
Dart-out Second	11	11	5	3	11	13	5	3	14	10	2
Midblock Dash	10	8	6	2	15	19	10	1	11	20	16
Total Midblock Darts and Dashes	58%	49%	20%	10%	67%	56%	30%	8%	62%	49%	27%
Intersection Dash	5%	14%	15%	8%	11%	19%	18%	18%	7%	14%	17%
VTM/Turn Vehicle	2	5	14	18	5	1	5	18	3	5	11
Multiple Threat	1	6	12	8	1	3	3	1	-	1	1
Bus Stop	-	-	1	1	-	1	2	-	-	3	7
Backing	10	2	2	7	4	1	3	3	2	1	1
Vendor	5	6	2	-	1	2	-	-	2	2	-
Ped not in Road	8	6	9	11	7	3	10	10	8	8	6
Auto-Auto	1	1	3	7	-	1	3	1	1	1	1
Disabled Vehicle	-	-	-	2	-	-	-	4	1	-	-
Trapped	-	-	-	1	-	-	1	1	-	-	-
Ped struck Vehicle	1	1	1	1	-	2	3	4	1	1	1
Weird	-	-	1	1	-	-	-	3	1	-	-
Other	2	3	9	13	-	6	13	n.a.	3	3	8
Not Classifiable	6	7	11	13	4	5	10	27	11	13	17
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

n.a. - "Other" code not used for Columbus adults; "Not Classifiable" includes "Other"

Road is a problem for all children. The number one problem is still the midblock darts and dashes, however, they appear to be suppressed when compared with the baseline distribution.

Table 19 shows the number of midblock dart and dash accidents and all other child accidents by year for the baseline and program periods. The results clearly show reductions in child accidents and these reductions are greater for the midblock darts and dashes. In Los Angeles, midblock darts and dashes dropped by 18%, baseline to program, while other accidents involving children actually increased 7%. In Columbus, the midblock darts and dashes dropped 36% but other accidents also dropped by 32%. In Milwaukee, the drop was 18% for midblock darts and dashes and 10% for other crashes. However, a closer look at the Milwaukee data shows a 29% drop in midblock darts and dashes for 1977, the year of greatest program exposure, followed by only a 7% drop from baseline in 1978. As will be shown later, these reductions of 18% (Los Angeles), 36% (Columbus) and 18% (Milwaukee) are all statistically significant. Los Angeles and Milwaukee provide the clearest evidence for program impact. The Columbus reduction, while large, is difficult to interpret since other accidents were decreasing at nearly the same rate as the midblock darts and dashes. Additional analyses, reported at the end of this Chapter, show that the reductions were most apparent in the age range from about three or four years to seven or eight years.

Several analyses were conducted to determine if the reductions in midblock darts and dashes were uniform across all accident descriptors or if the reductions could be attributed to only those darts and dashes which occurred, for instance, on certain days of the week or certain times of the day, etc. With one exception, there was no consistent evidence that some darts and dashes were reduced while others were not. Rather, a uniform reduction was seen. The specific accident descriptors examined were:

Time of day	Ped sex	Type of road
Day of week	Ped injury severity	Vehicle Type
Driver age	Weather	Traffic control
Driver sex	Road conditions	Vehicle Action

The one variable, or accident descriptor, which did show a meaningful difference between the baseline and program period was "Pedestrian Spanish Surname" which was coded in Los Angeles though not in Columbus and Milwaukee. Simply, there was evidence that children with Spanish surnames were influenced little or not at all by the Willy program, while non-Spanish children provided most or all of the observed accident reduction. The data were as follows:

Accidents per Year for Children Ages 1-14

	Baseline 73-75	Transition 76	Program 77-78	χ^2 (based on row frequencies with 2 d.f.)
Spanish Surname				
Mid Darts and Dashes	152.7	191	202.5	0.57, N.S.
All other	166.3	200	235.0	
Non-Spanish				
Mid Darts and Dashes	409.3	315	260.0	26.12, p<.001
All Other	407.3	428	379.0	

Table 19. Number of Midblock Dart and Dash Accidents by Year Involving Children (1-14 years) for All Three Cities

City	Accident Type	1973	Pre 1974	1975	Transition 1976	Post 1977	Post 1978	% Change Pre-Post
Los Angeles	Darts and Dashes	577	544	571	507	457	471	-18%
	All Other	577	577	577	632	611	627	+ 7%
		1973	Pre 1974	Pre 1975	Pre 1976	Post 1977	Post 1978	
Columbus	Darts and Dashes	176	156	178	151	111	101	-36%
	All Other	175	166	130	121	113	89	-32%
			Pre 1974	Pre 1975	Pre 1976	Post 1977	Post 1978	
Milwaukee	Darts and Dashes		202	205	195	142	186	-18%
	All Other		205	221	229	206	187	-10%

Note: Darts and Dashes include Dart-out First, Dart-out Second and Midblock Dash only.

As shown above, the distribution of Spanish child accidents shows a steady increase into the program period for both midblock darts and dashes and other accidents. For non-Spanish children, darts and dashes dropped by 36% while other accidents remained relatively stable. The distribution of Spanish surnames (darts and dashes vs. other) did change significantly. This result is totally consistent with the fact that the Willy materials were produced in English only (not Spanish) and were not distributed to the major Los Angeles Spanish language television station.

2. <u>State-Wide Data</u>

The city results permitted an examination of specific accident type and utilized hard-copy reports which were cross-checked, etc. The state data presented in this section were taken directly from state provided accident tapes or printouts. Hard-copy reports were not accessed and the numbers of accidents reported from the city results may not correspond exactly to the numbers from the state results. As detailed earlier, different definitions and procedures were typically involved in the preparation of the three state data sets and the city data sets.

The results for Los Angeles are shown in Table 20. The data are shown separately for crashes involving 5-9 year olds only and all children ages 0-14. Adult crashes are also shown, though their relationship to child crashes is unclear. The distribution of adult accident types is quite different from the child distribution and, in Los Angeles, some of these adult types were the subject of other countermeasure activities. Therefore, the adult data should not be considered as a comparison or control for the child events. Each data set, child and adult, is shown separately for various areas of California. Los Angeles covers only the City of Los Angeles. Los Angeles County, Orange County and "Southern Cities" are areas which, for the most part, could receive Los Angeles television and thus were exposed to the TV spots but were not part of the in-school program. However, it should be noted that parts of Los Angeles County are in the Los Angeles Unified School District and did receive the in-school film after the film had been to all of the City schools. This was permitted in the Fall of 1977 and, as shown in the Table, there appears to be a drop in Los Angeles County child accidents in 1978. The last two data sets cover large and small cities in Northern California which should not have had any exposure to the Willy program at least during the years covered.

As shown in the Table, the drop in child accidents, 5-9 and 0-14, was greater in Los Angeles than in any of the other areas. Comparisons were made, pre versus post, Los Angeles versus each of the other areas for 5-9 and 0-14 year olds using the χ^2 test. Approximately half of these comparisons were statistically significant at the .05 level or beyond. The comparison of greatest interest would be the one involving the large northern cities not exposed to the Willy program. For 5-9 year olds, this comparison was statistically significant (χ^2=5.22 $p<.05$ with 1 d.f.). For 0-14 year olds the comparison was not statistically significant though clearly close to significance (χ^2=2.78 $p<.10$ with 1 d.f.). Also, this comparison was statistically significant when looked at only for 1977, the year of greatest program activity (χ^2=9.57 $p<.01$ with 1 d.f.). Thus, Willy Whistle produced a statistically significant reduction in child accidents, particularly among the target age group.

Table 20. State Provided Pedestrian Accident Data from California

	Pre				Post			3 yr.	3 yr.	% change
Child Age 5-9	1973	1974	1975	1976	1977	1978	1979	Pre	Post	Pre-Post
Los Angeles	590	623	594	569	482	515	533	1807	1530	- 15%
L.A. County (not L.A.)	686	642	677	727	709	629	659	2005	1997	0%
Orange County	181	191	183	194	158	177	207	555	542	- 2%
Southern Cities	147	142	128	150	117	122	132	417	371	- 11%
Large Northern Cities	192	163	195	182	206	166	174	550	546	- 1%
Small Northern Cities	79	68	66	66	71	64	64	213	199	- 7%
Child Age 0-14										
Los Angeles	1201	1179	1198	1177	959	1047	1082	3578	3088	- 14%
L.A. County (not L.A.)	1422	1339	1499	1449	1387	1319	1370	4260	4076	- 4%
Orange County	429	429	416	437	372	414	397	1274	1183	- 7%
Southern Cities	294	297	287	297	239	254	272	878	765	- 13%
Large Northern Cities	401	352	419	352	389	359	349	1172	1097	- 6%
Small Northern Cities	150	153	147	150	152	167	151	450	470	+ 4%
Age 15+										
Los Angeles	1745	1813	1793	1916	1647	2130	2333	5351	6110	+ 14%
L.A. County (not L.A.)	1423	1427	1494	1616	1811	1978	1929	4344	5718	+ 32%
Orange County	398	342	415	439	449	610	575	1155	1634	+ 41%
Southern Cities	380	384	384	414	443	522	520	1148	1485	+ 29%
Large Northern Cities	529	453	553	507	572	588	612	1535	1772	+ 15%
Small Northern Cities	182	185	206	192	211	244	260	573	715	+ 25%

Note: Southern Cities--San Diego, Riverside and Santa Barbara
Large Northern Cities--San Jose, Oakland and Sacramento
Small Northern Cities--Fremont, Fresno, Stockton and Sunnyvale

The initial expectation from these analyses was that accident reduction would be greatest in Los Angeles, somewhat less in surrounding areas receiving television only and non-existent in areas not receiving any of the materials. While there was some evidence for this pattern of results, particularly in Orange County and "Southern Cities" during 1977, a clear picture did not emerge. Notably, Los Angeles County does not show a downturn in 5-9 year old accidents until 1978, which corresponds to the introduction of the Willy film in some of the County elementary schools during late 1977. Therefore, while it appears that Willy is effective and television is important, the Los Angeles results suggest that the in-school film is the more important element.

The results for Columbus are shown in Table 21. The data presentation is similar to that provided for Los Angeles. The data shown cover the City of Columbus, "Contiguous Counties" which should have been exposed to the television spots (only) and "Fringe Counties" which were, for the most part, also within range of Columbus television. The remaining areas in Ohio were beyond the range of the Columbus test. They include "Large Cities" (Cleveland, Dayton and Cincinnati), "other Urban" which consists of Counties with at least one city of 25,000 or more (1970 census) and "other Rural" which covers the remainder of the state.

As in Los Angeles, the drop in child accidents, 5-9 and 0-14, was greater in Columbus than in any of the other areas. Comparisons were made, pre versus post, Columbus versus each of the other areas for 5-9 and 0-14 year olds using the χ^2 test. All of these comparisons were statistically significant at the .05 level or beyond with the exception of the 5-9 year old comparison involving "Large Cities." Nevertheless, the 0-14 year old comparison involving "Large Cities" was statistically significant ($\chi^2=6.55$ $p<.05$ with 1 d.f.). These results suggest that the Willy program was effective in reducing child accidents in Columbus.

As before, the initial expectation was that accident reduction would be greatest in Columbus, somewhat less in "Contiguous" and "Fringe" areas receiving television only and non-existent in the other areas of the state. This expectation was not realized. In fact, child accidents actually increased in those Ohio Counties which are contiguous to Columbus (or Franklin County which contains Columbus). As in Los Angeles, these results suggest that the in-school film was the more important component of the Willy Whistle campaign.

The results for Milwaukee are shown in Table 22. The data presentation is analogous to that provided for Columbus. The "Contiguous Counties" are those close to Milwaukee and the "Fringe Counties" are further away though much of their area can probably be reached by Milwaukee television. "Other Urban" covers the more urban counties of Wisconsin beyond the range of Milwaukee television and "Other Rural" covers the remainder of the State.

As in Los Angeles and Columbus, the drop in child accidents, 5-9 and 2-14* was greater in Milwaukee than in any of the other areas. Comparisons were made, pre versus post, Milwaukee versus each of the other

*Due to data recording conventions employed for Wisconsin, ages less than 2 could not be reliably detected for analysis.

Table 21. State Provided Pedestrian Accident Data from Ohio

	Year								
	Pre			Post			3 yr.	3 yr.	% change
Child Age 5-9	1974	1975	1976*	1977	1978	1979	Pre	Post	Pre-Post
Columbus (city)	138	144	144	118	116	97	426	331	- 22%
Contiguous Counties	59	40	46	60	52	58	145	170	+ 17%
Fringe Counties	69	61	74.5	64	80	63	204.5	207	+ 1%
Large Cities	487.5	430	461	411	390	340	1378.5	1141	- 17%
Other Urban	418	416	476.5	452	422	373	1310.5	1247	- 5%
Other Rural	204	195	222.5	216	247	213	621.5	676	+ 9%
Child Age 0-14									
Columbus (city)	291	293	281	226	202	194	865	622	- 28%
Contiguous Counties	117	96	94	122	90	103	307	315	+ 3%
Fringe Counties	143	131	152	129	137	131	426	397	- 7%
Large Cities	877.5	779	884	758	715	658	2540.5	2131	- 16%
Other Urban	910	827	945.5	858	847	739	2682.5	2444	- 9%
Other Rural	413	407	444.5	475	466	388	1264.5	1329	+ 5%
Age 15+									
Columbus (city)	240	231	212.5	224	252	214	683.5	690	+ 1%
Contiguous Counties	80	75	79	93	120	113	234	326	+ 39%
Fringe Counties	96	101	104.5	120	115	110	301.5	345	+ 14%
Large Cities	722	815	810	778	815	810	2347	2403	+ 2%
Other Urban	720	723	774.5	846	820	872	2217.5	2538	+ 14%
Other Rural	359	397	418	486	475	480	1174	1441	+ 23%

*1976 data for September to December was estimated based on average of 1973 and 1974.

Note: Contiguous Counties—Counties that border Columbus (Madison, Union, Delaware, Licking, Fairfield, Pickaway and part of Franklin)

Fringe Counties—Near Columbus but not bordering (Fayette, Ross, Licking, Perry, Muskingum, Knox, Morrow, Marion, Logan, Champaign and Clark)

Large Cities—Cleveland, Cincinnati and Dayton (Akron and Toledo excluded due to missing data from 1974)

Other Urban—Counties with at least one city of 25K or more (but not covered above)

Other Rural—All else

Table 22. State Provided Pedestrian Accident Data from Wisconsin

	Year						Summary		
	Pre			Post			3 yr.	3 yr.	% change
	1974	1975	1976	1977	1978	1979	Pre	Post	Pre-Post
Child Age 5-9									
Milwaukee (city)	221	234	223	173	199	173	678	545	- 20%
Contiguous Counties	82	94	90	81	68	88	266	237	- 11%
Fringe Counties	34	46	37	44	47	37	117	128	+ 9%
Other Urban	53	58	66	62	71	62	177	195	+ 10%
Other Rural	100	91	100	94	102	99	291	295	+ 1%
Child Age 2-14									
Milwaukee (city)	415	424	425	350	368	324	1264	1042	- 18%
Contiguous Counties	164	173	166	171	154	172	503	497	- 1%
Fringe Counties	79	102	88	84	82	86	269	252	- 6%
Other Urban	123	130	134	111	129	130	387	370	- 4%
Other Rural	210	176	204	196	203	184	590	583	- 1%
Age 15+									
Milwaukee (city)	457	428	427	461	454	513	1312	1428	+ 9%
Contiguous Counties	236	234	207	264	280	314	677	858	+ 27%
Fringe Counties	128	117	125	169	165	182	370	516	+ 39%
Other Urban	191	255	249	258	296	339	695	893	+ 28%
Other Rural	325	334	358	396	410	411	1017	1217	+ 20%

Note: Contiguous Counties--Counties that border Milwaukee (Racine, Waukesha, Ozaukee and parts of Milwaukee County and Washington)
Fringe Counties—Near Milwaukee, but not bordering (Kenosha, Walworth, Jefferson, Dodge, Fond Du Lac, Sheboygan)
Other Urban—Counties with one city of 50K or more (Dane, LaCrosse, Winnebago, Outagamie and Brown)
Other Rural--All other Wisconsin Counties

areas for 5-9 and 2-14 year olds using the χ^2 test. Five of the eight possible comparisons were statistically significant at the .05 level or beyond. The non-significant comparisons involved 5-9 year olds in "Contiguous Counties" and 2-14 year olds in "Fringe Counties" suggesting a possible effect of television in these outlying areas. The remaining non-significant comparison involved 2-14 year olds in "other Urban." However, this comparison was statistically significant for 5-9 year olds (χ^2=7.08 p<.01 with 1 d.f.) and did approach statistical significance for 2-14 year olds (χ^2=3.12 p<.10 with 1 d.f.). Thus, these results clearly suggest that the Willy program was effective in reducing child accidents in Milwaukee.

As in the other tests, it was expected that Milwaukee would show the greatest accident reduction followed by "Contiguous" and "Fringe" areas that would be exposed to the television spots but not the in-school film. In Milwaukee, there was some evidence for this effect involving 5-9 year olds in the "Contiguous Counties." Here, accident reduction was 11% as compared with 20% in Milwaukee and accident increases in the other areas of Wisconsin.

In summary, the State-wide data from California, Ohio and Wisconsin show clear evidence of program impact. Accident reductions involving 5-9 year olds as well as all children were invariably greater in Los Angeles, Columbus and Milwaukee than in other areas of their respective states.

3. Time Series Statistical Testing

In each of the three test areas, accident data were collected for at least three years prior to the safety campaign and for about two or three years while the campaign was in effect. This yielded a standard pre-post design, with comparison areas drawn from other urban areas within the same states. However, there might have been trends of increasing or decreasing accident rates through the whole study period. While these trends could translate into net differences between baseline and program periods, the differences would be more properly attributable to the underlying trend rather than the safety program.

Accordingly, the statistical analyses covered in this section utilized accidents per month as basic units of measurement and emphasized time series analysis as the most appropriate procedure to isolate and quantify effects which could be attributed to the Willy Whistle safety campaign. The analysis procedure followed two basic steps:

- o Display the accident results as numbers of accidents per month, with monthly (i.e., seasonal) mean differences removed. This eliminated a frequently large source of variability which was unrelated to the test hypotheses but confounded with their evaluation. This display provided initial evidence of annual trend effects which could mask or exaggerate safety program results and also quantified the basic magnitude of baseline/ program period differences uncorrected for the time-related factors dealt with below.

- Use Box-Jenkins time series analysis procedures to isolate specific time-sequence components of data variation and, within that framework, to determine the size and statistical significance of safety campaign-related effects. Two types of time series analysis were used which provided answers to the questions from somewhat different perspectives. They were:

    - Baseline with forecasts--With only the accident data from baseline months, the time series model was developed which best described those data. The model was used to forecast the program period data (as it could best be predicted from the baseline information above), and the forecasts were compared with the actual program accident data. In general, the degree to which forecast data based only on the baseline overestimated the actual accident data was an index of the magnitude of the Willy Whistle effect.

    - Intervention analyses (baseline and program data)--With all accident data, a best-fitting time series model was developed. In this modeling, a parallel time series representing the safety program was used as a transfer function. Various coefficients could possibly relate the safety program series to the accident data series. The values and statistical significance of those coefficients lead directly to judgments about how the safety program influenced the accident rates, and how much.

The results from these analytic steps were then coordinated to provide the single best description of the patterns and differences present in the data.

As will be shown later in this chapter, the major accident reduction was in darts and dashes involving young children from about 3 to about 8 years of age. For these data, for Los Angeles, Columbus and Milwaukee, the analyses described above were a direct test of the ultimate safety effect of the Willy Whistle campaigns. Also, as indicated above, it was plausible that the message campaign might reduce dart and dash accidents for other children and/or other types of accidents for children within the key age ranges. These accident frequency series were also analyzed as were the primary series.

Finally, the analyses described could only identify rate changes which occurred along with the safety campaigns--they could not strictly impute causality. Data from nearby similar areas were identified from the state data tapes and tabulations described earlier, and those data series analyzed by the same time series procedures. To the extent that those data failed to follow the same patterns as the test area data, the possibility could be ruled out that there were statewide accident trends which coincidentally tracked the safety program introduction.

These analyses and their implications for the accident reduction effects of the Willy Whistle safety campaign are summarized below for the three test cities and for comparison sites within their states. Except as noted, these city data were taken from the cross-checked and accident type coded data supplied by or through the test cities. Comparison data from similar areas within each state were taken from the state accident files and, as described earlier, were not subject to the same extensive cross-checks.

a. Los Angeles

Accident data for Los Angeles and for comparison areas throughout California were collected for the six years from 1973 through 1978. The first 38 months were in the "baseline" period, with no Willy Whistle safety program. Beginning in March 1976, the school program took effect, although it was not judged to be fully implemented until the start of the next school year. The use of the TV spots by local television stations began at essentially the same time, although a few plays were recorded in February 1976.

For the Los Angeles safety program test, seven monthly series were identified which were of direct or comparison interest. Their general features are described in Table 23. In general, the series showed moderate annual cycles. For children, accidents were less frequent in winter months (November through February) and more frequent in spring and early summer (April through July). For adults the pattern nearly reversed, with above average accident rates in October through February and below average rates from April through August.

Los Angeles, Darts and Dashes, Children Ages 3-8. Correcting for monthly means revealed that accidents were reduced by over 5.5 accidents per month during the program period. Because the accident rates rose very slightly from the beginning of the baseline period to the end of the baseline period, this reduction may be thought of as a very slightly conservative estimate of the true change.

Time series analyses confirmed this result. The best model based only on the baseline period was:*

$$Y_t - 33.27 = (1 - .315B^3)(1 + .93B^{12})\ a_t.$$

*Where Y_t = the accident frequency values [at time t. The full series includes times t = 1 to t = 72 (1/1973 through 12/1978, of which t = 1-38 are baseline--through 2/1976 and t = 39-72 are program periods)].

a_t = the residuals, i.e., the actual frequency minus the value projected for time period t based on the equation and the frequencies for time periods 1 to t-1.

B is the backshift operator: $B(a_t) = a_{t-1}$, $B^2(Y_t) = Y_{t-2}$, etc.

For more detail of the theory and practice of time series analysis, see Box and Jenkins (1976) and McCleary and Hay (1980).

Table 23. Los Angeles and Northern California Accident Data Series

	$\bar{X}$[1]	1973[2]	1974	1975	1976	1977	1978	Pre[3]	Post[3]
LA, 3-8 D&D	31.36	2.97	1.97	3.89	-1.28	-3.94	-3.61	2.67	-2.98
LA, 0-2, 9-14 D&D	12.07	1.68	-.07	.26	.10	-1.40	-.57	.75	-.84
LA, 0-14 All Acc	93.43	2.74	-.10	2.24	1.49	-4.43	-1.93	1.87	-2.09
NoCal 3-8 All	19.15	3.10	-1.99	1.10	-.74	-.24	-1.24	.65	-.72
NoCal 0-14 All	31.56	1.86	-2.22	3.36	-2.22	.86	-1.64	.78	-.88
LA, 15+ All	175.75	-16.75	-12.33	-9.67	5.08	5.17	28.50	-12.21	13.64
NoCal 15+ All	46.94	-1.53	-6.94	2.89	-1.94	2.97	4.56	-2.08	2.33

1. Average number of accidents per month
2. Yearly figures are deviations from X, in accidents per month
3. "Pre" includes 1/73-2/76; "post" extends from 3/76-12/78 Because these periods are not full years and because different months have consistently different accident rates, the figures are averaged deviations from monthly means.

* * * * * *

The model shows a strong yearly component together with a smaller parameter at a period of three months which simply smooths data irregularities. While this model fit the baseline period well, the actual data for the program period fell below the model's forecasts by an average of 5.1 accidents/month (significantly different from zero at $p<.001$). No similar model provided a satisfactory fit to the entire series, probably because of the sudden drop in accident rates in the program period.

Intervention analyses were performed with two types of intervention series. These series are shown, together with the monthly accident counts for the midblock darts and dashes involving 3-8 year olds in Table 24. The first, "Willy off/on," consisted of an "X" series which had values of "1" from 3/76 through 9/76 and a "Z" series which had values of "1" from 10/76 to 12/78. The "X" series was a measure of low level program activities (as seen in exposure data) during the first seven months and the "Z" series was a measure of the full program. The second, "Willy TV," is the actual number of confirmed television plays of the Willy Whistle spots, beginning in 2/77, continuing heavily through the 1977-1978 school year and including some residual activity through 12/78. A model with these two intervention series was:

$$Y_t = -2.280X_{t-2} - 5.347Z_{t-2} + \frac{(1-.94B^{12})a_t}{(1-B^{12})}$$

The X transfer parameter of -2.280, though not statistically significant, suggests possible accident reduction in the early months. The Z transfer parameter of -5.347, which was significant, suggests that accidents were reduced by about five per month. Using the actual number of Willy TV plays as the "X" or intervention series, led to a similar model:

$$Y_t = -.295X_{t-2} + \frac{(1-.91B^{12})(1+.34B)a_t}{(1-B^{12})}$$

This model showed about 4.7 accidents/month reduction during the period, consistent with the other estimates.

Overall, dart and dash accidents for the critical 3-8 age children declined by about 5.5 accidents per month in Los Angeles during the period of the Willy safety program. This represents 16% of the baseline rate for such accidents and is a major improvement. To place these results in perspective, the comparison series summarized in Table 23 were also analyzed for accident rate changes coincident with the safety program. The monthly accident data for those series are listed in Appendix B, along with the best fitting time series models. Only the most salient results will be discussed below.

Los Angeles Comparison Series. Two series represent logical areas of generalization for the safety program. The first, Los Angeles dart and dash accidents for other children (0-2 and 9-14 years old) showed a slight (1.6 accidents/month) drop from baseline to program months. This difference was nearly significant ($t = 1.79$, 70 d.f., $p<.10$). However, there was a

Table 24. Los Angeles Child Accident Data (Midblock Darts and Dashes Involving 3-8 Year Olds) by Month with Two Intervention Series

			J	F	M	A	M	J	J	A	S	O	N	D
1973	3-8 D&D		28	23	46	42	43	43	36	27	29	47	26	22
	Willy off/on	X	0	0	0	0	0	0	0	0	0	0	0	0
		Z	0	0	0	0	0	0	0	0	0	0	0	0
	Willy TV		0	0	0	0	0	0	0	0	0	0	0	0
							*	*	*	*	*			
1974	3-8 D&D		23	38	29	37	49	49	30	37	27	27	26	28
	Willy off/on	X	0	0	0	0	0	0	0	0	0	0	0	0
		Z	0	0	0	0	0	0	0	0	0	0	0	0
	Willy TV		0	0	0	0	0	0	0	0	0	0	0	0
							*	*	*	*	*			
1975	3-8 D&D		32	29	47	52	45	30	33	30	39	34	26	26
	Willy off/on	X	0	0	0	0	0	0	0	0	0	0	0	0
		Z	0	0	0	0	0	0	0	0	0	0	0	0
	Willy TV		0	0	0	0	0	0	0	0	0	0	0	0
							*	*	*	*	*			
1976	3-8 D&D		26	21	31	31	43	37	34	27	18	39	28	26
	Willy off/on	X	0	0	1	1	1	1	1	1	1	0	0	0
		Z	0	0	0	0	0	0	0	0	0	1	1	1
	Willy TV		0	9	6	6	9	19	30	16	8	11	17	10
							*	*	*	*	*			
1977	3-8 D&D		19	29	24	28	28	28	28	34	37	26	23	25
	Willy off/on	X	0	0	0	0	0	0	0	0	0	0	0	0
		Z	1	1	1	1	1	1	1	1	1	1	1	1
	Willy TV		6	2	5	4	1	12	19	20	19	25	9	23
							*	*	*	*	*			
1978	3-8 D&D		25	17	23	44	41	34	35	32	22	25	15	20
	Willy off/on	X	0	0	0	0	0	0	0	0	0	0	0	0
		Z	1	1	1	1	1	1	1	1	1	1	1	1
	Willy TV		18	12	12	20	10	4	5	7	1	1	1	4

regular decrease in these accidents during the baseline period which, if projected through the program period would account for the full difference. Thus, there is no convincing evidence of the generalization of safety program effects to other age groups in Los Angeles. The second series is all pedestrian accidents in Los Angeles occurring to children (ages 0-14). That series showed a drop of about 4.0 accidents per month during the program period. Since the series includes the 3-8 year old dart and dash accidents, subtracting that subset (and its drop of 5.5 accidents/month) leaves a small net increase of other children's accidents. This difference was not statistically significant. Thus, there is no evidence from this series that the safety program benefits extended to other than dart and dash accidents.

Two children's accident series from the state-provided data were produced for the upstate California urban areas of San Jose, Oakland and Sacramento. These cities were well outside the safety program area but, as California urban areas, were subject to the same statewide safety programs or other factors which might have influenced the Los Angeles accident rates. They were studied to determine if trends existed which were similar to those in the Los Angeles data and would therefore cast doubt on the attribution of accident reduction to the Willy program. The first series was of all pedestrian accidents to 3-8 year old children in the northern cities (the data, summarized by the state, could not be divided into dart and dash vs. other accident types). Accidents in this comparison series decreased by almost 1.4 accidents per month from the baseline to the program period. However, the drop was fully explained by a decreasing trend in the baseline years extended through the program period. In addition, none of these trends reached statistical significance. The second series, all 0-14 year old children's accidents in Northern California, showed a drop of about 1.7 accidents/month in the program years, only a very slight drop beyond that shown in the 3-8 subset. This drop was not statistically significant in itself or in relation to the safety program implementation. Thus, there is no evidence that an accident drop similar to that seen in Los Angeles occurred in other California urban areas which were outside the safety program impact region.

Two "adult" (ages 15 and above) pedestrian accident series, for Los Angeles and for the northern California cities, were also examined. Both showed no effects which could be related to the safety program. Unlike all the child accident series, the two adult series rose consistently throughout the six year data period, with the increase at least as great in the last year as in earlier years. In Los Angeles, the adult rate in 1978 was 29% higher than in 1973; in northern California, the change was over 13%.

b. Columbus

The Willy Whistle in-school safety program began in Columbus schools and on Columbus TV stations in April 1977. Pedestrian accident data were available, as indicated earlier, from January 1973 through all of 1978. Comparison accident data were abstracted from tabulations made from state-supplied computer tapes. Three cities, Cleveland, Dayton and Cincinnati (C-D-C), were used as comparison areas because they were large urban areas outside the range of Columbus television stations.

While accident data were available (from thorough screening of all hard-copy accident reports) from Columbus for a six-year period, the state data tapes were available only from 1974 through 1978. Careful checking of the state tapes revealed that data were absent (and could not be recovered) for approximately the last four months of 1976. Discussions with record-keeping officials indicated that this was an administrative problem and, to the best of their knowledge, did not represent an anomalous period in Ohio. Therefore, to complete the times series analyses, values for the missing months were estimated for the comparison cities based on the accident frequencies from the same months in other years.

Table 25 summarizes six monthly accident series from Columbus and the C-D-C comparison cities. All series showed accident rate decreases during the program period, and all the drops were statistically significant except for the Columbus adults. Within the test area of Columbus, however, the accident drops were large, from 33% for all accidents to 0-14 year olds to 38% for darts and dashes for all 0-14 year olds. In the comparison areas and for Columbus adults, the maximum drop was only 11%. This difference was found to be statistically significant ($p<.05$); accident rates dropped significantly more for the Columbus children's accident series than in any of the comparison series.

Columbus, Darts and Dashes, Ages 3-8. The monthly accident rates are shown in Table 26, together with the series representing the intervention of the Willy Whistle safety program (values of 0 through March 1977, and 1 through the rest of the period). The accident series dropped irregularly in the baseline period, but even so the time series model for the baseline data forecast significantly higher than the actual data of the program period. On the basis of this model:

$$Y_t = \frac{(1-.87B^{12})a_t}{(1-B^{12})}$$

the program period data were about 2.77 accidents per month below what could be predicted from the baseline accidents ($p<.05$ one tailed). The developed time series model based on all 72 months and including an intervention series was as follows:

$$Y_t = -3.00X_{t-1} + \frac{(1-.92B^{12})a_t}{(1-B^{12})}$$

The intervention coefficient of -3.00 specifies an average accident reduction of about 3 accidents per month in the program period compared with the baseline period. Overall, this drop of about 3.0 accidents per month represents about 33% of darts and dashes occurring to children ages 3-8 in Columbus. However, when comparing these results with those from Los Angeles and Milwaukee, the reader is cautioned to be sensitive to the differing sample sizes involved and the fact that accidents other than darts and dashes were also decreasing in Columbus during this period.

Table 25. Columbus (Cols) and Cleveland-Dayton-Cincinnati (CDC) Accident Data Series

	X[1]	1973[2]	1974	1975	1976	1977	1978	Pre[3]	Post[3]
Cols, 3-8 D&D	8.35	1.24	.74	2.40	-.10	-1.68	-2.60	.84	-2.03
Cols, 0-14 D&D	12.12	2.54	.88	2.71	.46	-2.88	-3.71	1.34	-3.26
Cols, 0-14 All Acc	23.15	6.10	3.68	2.51	-.49	-4.49	-7.32	2.24	-5.44
CDC[6] 5-9, All Acc	35.87	-[4]	3.88	-.03	1.13[5]	-1.62	-3.37	1.30	-2.42
CDC 0-14, All Acc	66.10	-[4]	5.23	-1.18	5.40	-2.93	-6.52	2.56	-4.76
Cols 15+, All Acc	24.99	6.10	-.15	.51	-1.57	-2.49	-2.40	.50	-1.21

1. Average number of accidents per month.
2. Yearly figures are deviations from X, in accidents per month.
3. "Pre" includes 1/73 (1/74 for CDC series)-3/77; "post" extends from 4/77-12/78. Because these periods are not full years and because different months have consistently different accident rates, the figures are averaged deviations from monthly means.
4. State accident tapes were not available for 1973.
5. September-December were missing from state accident tapes. Estimates were generated from the values for the same months from earlier and later years.
6. Cleveland-Dayton-Cincinnati.

* * * * * *

Table 26. Columbus Child Accident Data (Midblock Darts and Dashes Involving 3-8 Year Olds) by Month with Two Intervention Series

		J	F	M	A	M	J	J	A	S	O	N	D
1973	3-8 D&D	5	7	10	18	11	12	10	10	11	10	6	5
	Willy	0	0	0	0	0	0	0	0	0	0	0	0
							* * * * *						
1974	3-8 D&D	3	8	15	11	14	7	10	11	10	9	4	7
	Willy	0	0	0	0	0	0	0	0	0	0	0	0
							* * * * *						
1975	3-8 D&D	5	4	13	16	18	15	13	13	8	14	6	4
	Willy	0	0	0	0	0	0	0	0	0	0	0	0
							* * * * *						
1976	3-8 D&D	1	7	12	10	12	13	12	11	6	3	7	5
	Willy	0	0	0	0	0	0	0	0	0	0	0	0
							* * * * *						
1977	3-8 D&D	1	1	8	13	10	11	7	6	5	7	4	7
	Willy	0	0	0	1	1	1	1	1	1	1	1	1
							* * * * *						
1978	3-8 D&D	2	2	8	13	10	5	7	6	8	5	0	3
	Willy	1	1	1	1	1	1	1	1	1	1	1	1

For all children's pedestrian accidents (ages 0-14), the program period averaged 7.7 accidents per month fewer than the base period. The best time series description of these data ascribes the difference to a steady decrease of about 2.7 accidents per month per year. The best transfer model, however, showed a significant relationship between the accident data and the safety program intervention and the model was nearly as good in describing the accident data. The results for this series, then, are equivocal but not inconsistent with the prior findings, namely that the safety program related significantly to a drop in all children's dart and dash accidents in Columbus. These results do not, however, provide evidence of a reduction of other children's accidents due to the safety program.

Columbus Comparison Series. For Cleveland-Dayton-Cincinnati C-D-C, accident data were unavailable for 1973; thus the analyses were based on a shorter "baseline" period. Also, data for the last third of 1976 were missing and had to be estimated. These data deficiencies make the results of the analyses less persuasive.

The conclusions to be reached from the C-D-C 5-9 year old children's accidents differ from those of all C-D-C children's accidents. For the 5-9 year old children's data, the drop of about 3.7 accidents per month between baseline and program period can effectively be described as a confirmation of a downward trend from the baseline months. Because the 1976 data are quite high for all C-D-C children's accidents, however, there is only a slight downward trend to project through the program period. There is a significant drop of about 5.4 accidents per month in the program period, representing about 8% of the accidents.

Pedestrian accidents involving adults (ages 15+) in Columbus dropped by 1.7 accidents per month from baseline to program period--the entire difference attributable to a quite high accident level in 1973, the first baseline year. There was no accident drop which was coincident with the safety program.

Overall, then, there was a 33% drop in dart and dash accidents involving 3-8 year olds in Columbus. Other children's accidents in Columbus were probably not influenced by the safety program, though the evidence was inconclusive. Comparison series, involving children in Cleveland, Dayton and Cincinnati, showed no drop in accidents for children 5-9 but a small but significant drop for all children coincident with the safety program in Columbus. Adults in Columbus showed no change in their pedestrian accident involvement.

c. Milwaukee

The child pedestrian program went into effect in March of 1977. It included posters in all primary schools, the frequent showing of the seven-minute safety film in these schools and TV spots. Accident reports were coded for Milwaukee children for 1974 through 1978, or 38 baseline months and 22 program months. State data tapes were analyzed for 1973 through 1979, or 50 baseline months and 34 program months. Data for key accident series are summarized in Table 27. The series for Milwaukee adults and for all other urban accidents were taken from analyses of the state

Table 27. Milwaukee and Other Urban Wisconsin Areas Accident Data Series

	X^1	1973[2]	1974	1975	1976	1977	1978	1979	Pre[3]	Post
Milw, 3-8 D&D	11.23		.93	1.43	.93	-3.23	-.07		1.00	-1.73
Milw, Child 3-8 D&D	21.75		.08	1.08	1.42	-.75	-1.83		.89	-1.54
Milw, all 0-14	32.98		1.02	2.52	2.35	-3.98	-1.90		1.89	-3.27
Other Urban, 5-9All	5.23	.36	-.81	-.39	.27	-.06	.69	-.06	-.17	.25
Other Urban, 0-4, 10-14	5.52	.64	.39	.64	.14	-1.44	-.61	.23	.45	-.67
Milw, Adult (15+)	38.43	2.24	-.35	-2.76	-2.85	-.01	-.60	4.32	-.75	1.11
Other Urban, Adult	21.64	-2.48	-5.73	-.39	-.89	-.14	3.02	6.61	-2.26	3.32

1 Average number of accidents per month

2 Yearly figures are deviations from X, in accidents per month

3 "Pre" includes 1/73 to 2/73; "post" extends from 3/77 to 12/79

computer tapes. The areas comprising "other urban" are the counties of Dane, LaCrosse, Winnebago, Ontagamie and Brown, ones which have cities of 50,000 inhabitants or more and which are outside the reach of Milwaukee television.

Overall, analyses showed a large and statistically significant drop in dart and dash accidents to 3-8 year olds in Milwaukee coincident with the introduction of the Willy safety program. This drop was larger than that shown in any comparison series, though two of those showed significant drops.

Milwaukee, Darts and Dashes for Children Age 3-8. An average drop of 2.7 accidents per month was noted between the baseline and the program period. The decline was concentrated in the first year of the program period, with the accident level back to baseline levels in 1978. The best time series model for the baseline period:

$$(1-B^{12})Y_t = (1-.868B^{12})\ a_t,$$

overestimated the program data by nearly 2.9 accidents per month or 26% of the monthly accident rate. The discrepancy was statistically significant ($p<.01$).

This accident series is shown in Table 28, along with three series representing the safety program activities. All those series have the value "0" for the baseline months. The first series uses "1" for all program months, representing the fact that activity of several kinds took place and assuming they occurred approximately equally over time. The second series is a count of the number of plays on commercial television of the Willy spots. The count stopped after June 1978, and "1" was used to describe a continuing but minimal level of TV activity. The third series tracks the activity of copies of the seven-minute Willy film lent by the Milwaukee Museum to schools in the city (chiefly private schools; public schools had closed circuit TV on which the seven-minute film was frequently played). The numbers in the series are reported numbers of children seeing the museum copies of the film when they were lent to the schools (again, "1" was used for months with no reports of film lending to represent a presumed minimum level of activity).

Because of the sharp drop in accidents from the start of the program through March 1978, no time series based on the intervention series described above adequately fit the data. An intervention model based on a series with the value "1" from March 1977, the start of the program, through February 1978, was developed which fit well:

$$Y_t = -4.215X_{t-1} + \frac{(1-.892B^{12})}{(1-B^{12})}\ a_t.$$

That specific intervention series would correspond to a safety program lasting one year and stopping abruptly. This does not correspond to evidence about the program activities and the series is presented because it is essentially the only one which would provide an adequate fit to the data. Simply, however, this model described a drop of 4.2 accidents/month from 4/77 through 3/78 and no drops elsewhere. This is consistent with the conclusions which could be drawn from the other analyses.

Table 28. Milwaukee Child Accident Data (Midblock Darts and Dashes Involving 3-8 Year Olds) by Month with Three Intervention Series

		J	F	M	A	M	J	J	A	S	O	N	D
1974	3-8 D&D	4	1	12	15	22	17	18	16	12	19	4	6
	Willy off/on	0	0	0	0	0	0	0	0	0	0	0	0
	Willy TV	0	0	0	0	0	0	0	0	0	0	0	0
	Willy Museum	0	0	0	0	0	0	0	0	0	0	0	0
						*	*	*	*	*			
1975	3-8 D&D	4	1	13	15	27	19	16	14	9	20	10	4
	Willy off/on	0	0	0	0	0	0	0	0	0	0	0	0
	Willy TV	0	0	0	0	0	0	0	0	0	0	0	0
	Willy Museum	0	0	0	0	0	0	0	0	0	0	0	0
						*	*	*	*	*			
1976	3-8 D&D	6	8	12	15	22	23	16	13	10	16	4	1
	Willy off/on	0	0	0	0	0	0	0	0	0	0	0	0
	Willy TV	0	0	0	0	0	0	0	0	0	0	0	0
	Willy Museum	0	0	0	0	0	0	0	0	0	0	0	0
						*	*	*	*	*			
1977	3-8 D&D	4	2	9	12	17	15	6	13	6	5	4	3
	Willy off/on	0	0	1	1	1	1	1	1	1	1	1	1
	Willy TV	0	0	22	31	24	20	18	12	11	5	13	13
	Willy Museum	0	0	14	758	2100	4725	1	1	210	685	140	2435
						*	*	*	*	*			
1978	3-8 D&D	4	4	5	15	21	19	12	15	15	11	6	7
	Willy off/on	1	1	1	1	1	1	1	1	1	1	1	1
	Willy TV	17	9	13	10	16	5	1	1	1	1	1	1
	Willy Museum	490	280	860	100	1	1	1	1	1	1	1	1

Milwaukee Comparison Series. Other child accidents in Milwaukee were analyzed in two forms. First, all child accidents except the age 3-8 darts and dashes were studied. There was a gradual increase in these accidents in the base years followed by a drop in the program period. Overall, there was an 11% decrease in accidents from base to program, about 2.4 accidents per month and the decrease was larger in 1978 than in the program months of 1977. This figure is consistent with time series analysis results and the difference is statistically significant ($p<.05$). Second, all child accidents in Milwaukee, the sum of the preceding two series, were analyzed. The results confirm the analyses of the parts. For this combined series, the base accident rates showed no trend and the accident rate dropped by about 5.2 accidents/month in the program period. Because the drop was sharper in 1977 than in 1978 (6.8 accidents per month vs. 3.8), the Willy TV intervention series provided a slightly better time series model than did the simple off/on intervention series.

Two child accident series from other Wisconsin urban areas were also evaluated for effects which were correlated with the safety program in Milwaukee. For accidents involving children ages 5-9, there was a slight (8%) increase in accidents which was not significant. For children ages 0-4 and 10-14, accidents declined by 1.1 accidents per month during the program, 18%, which was significant ($p<.05$). Taken together, the results do not represent pseudo-program effect; even though a drop was noted for children outside the critical program age, it was not confirmed in the primary age children.

Two adult series were also analyzed. Both series were taken from the state accident data tapes, since only Milwaukee children's hard-copy accident reports were available. The series, therefore, covered the seven years from 1973 through 1979. Neither showed an accident decline in the safety program years. In Milwaukee accidents to adults increased 5% between baseline and program periods. In the other urban areas of Wisconsin, there was an overall 26% increase. The increase was relatively regular and showed no discontinuities which might be associated with the timing of the safety program.

In sum, there was a significant and large drop in dart and dash accidents to children ages 3-8 in Milwaukee coincident with the implementation of the Willy Whistle safety program. The effect was limited to the first year of the program, however, unlike the persistent effects observed in Los Angeles and Columbus. In Milwaukee, there was also a significant drop in other children's accidents coincident with the safety program. Whether this drop can be attributed to the safety program is questionable, however, since accidents declined in a similar fashion for 0-4 and 0-14 year old children in urban areas outside the program's reach. Again, no changes in adult accidents were seen which were related to the safety program implementation.

4. Impact Summary

The previous section of this chapter talked about accidents per month and examined program related accident reduction across various age categories. The results showed that there was a statistically significant accident reduction in all three cities related to the Willy program. The purpose of the present section is to take a closer look at the ages of the children impacted by Willy and to summarize the accident reduction findings.

Table 29· shows child age in single years, baseline and post, across the three cities. The top half of the Table shows average number of midblock darts and dashes per year while the bottom half shows the sum of all other accident types (Intersection Dash, Multiple Threat, Vendor, Not Classifiable, etc.). First, as discussed earlier, about half of all child accidents are midblock darts and dashes and half are covered by all other accident types. However, while the overall figures are half and half, there are differences across the child ages. In general, with the exception of age one year, the younger the child the greater proportion of midblock darts and dashes. Ages four to six or seven are particularly critical since the absolute number of accidents is high and the proportion of midblock darts and dashes is also high. Thus, Willy had to be effective in this age range if the program were to show overall impact.

As shown in Table 29, total accidents on a simple pre/post basis, were reduced by 196 midblock darts and dashes per year across the three cities. Of these, 127 crashes were accounted for by children ages four, five and six. Dart and Dash accident reduction in the 4-6 age range was 31% as compared with 21% overall and 13% among children not aged 4-6. Clearly, then, Willy's greatest impact came during these very vulnerable years. It should be noted, however, that Table 29 shows some midblock dart and dash accident reduction in every year of age from 1-14.

In summary, the three cities represent a combined urban population of slightly more than four million people (1970 census) and experienced a child pedestrian accident rate of 1873 per year. About half of these crashes were midblock darts and dashes and nearly half of these darts and dashes involved children ages 4-6. In the two years following the introduction of Willy, the total child accident rate dropped 12%, midblock darts and dashes dropped 21% and midblock darts and dashes among the very vulnerable four, five and six year olds dropped 31%. The time series analyses presented earlier and data from comparison areas suggest that these results cannot be explained by general accident trends or statewide traffic changes.

Table 29. Accidents Per Year by Child Age for All Three Cities

Midblock Darts and Dashes	L.A. 73-5 Base	L.A. 77-8 Post	Columbus 73-6 Base	Columbus 77-8 Post	Milwaukee 74-6 Base	Milwaukee 77-8 Post	Total (3 cities) Base	Total (3 cities) Post	Diff. Base-Post
Child Age									
1	8.3	9.0	2.0	1.0	2.0	1.0	12.3	11.0	- 1.3
2	40.7	39.5	10.0	5.0	11.3	14.5	62.0	59.0	- 3.0
3	58.7	56.5	12.8	10.5	22.7	16.5	94.2	83.5	-10.7
4	76.0	54.0	19.5	11.0	30.0	15.0	125.5	80.0	-45.5
5	86.3	60.5	18.5	11.0	30.0	24.5	144.8	96.0	-48.8
6	84.3	65.0	24.2	16.0	31.0	25.5	139.5	106.5	-33.0
7	65.0	51.5	16.2	17.0	21.7	21.5	102.9	90.0	-12.9
8	41.3	43.5	11.8	9.0	12.7	12.0	65.8	64.5	- 1.3
9	33.3	31.0	9.0	10.0	9.0	5.5	51.3	46.5	- 4.8
10	21.0	15.5	8.5	3.5	7.7	11.0	37.2	30.0	- 7.2
11	17.3	10.0	6.8	4.0	4.0	5.5	28.1	19.5	- 8.6
12	9.7	11.0	7.0	4.0	8.7	4.5	25.4	19.5	- 5.9
13	11.7	10.0	5.5	1.5	3.7	4.0	20.9	15.5	- 5.4
14	10.3	7.0	3.5	2.5	6.3	3.0	20.1	12.5	- 7.6
							930.0	734.0	-196.0
All Other Accidents									
1	11.0	22.0	1.5	1.0	1.0	1.5	13.5	24.5	+11.0
2	22.6	30.0	6.2	3.5	5.7	5.0	34.5	38.5	+ 4.0
3	30.3	28.0	7.2	3.5	7.6	9.5	45.1	41.0	- 4.1
4	42.0	38.0	11.2	5.5	13.7	12.5	66.9	56	-13.9
5	54.0	52.5	12.2	8.0	23.7	16.0	89.9	76.5	-13.4
6	57.7	55.0	19.0	12.0	26.0	30.0	112.7	97	- 5.7
7	54.3	67.0	16.8	15.0	24.0	15.5	95.1	97.5	+ 2.4
8	52.7	56.0	11.7	8.0	24.0	19.0	88.4	83	- 5.4
9	50.3	43.5	10.0	7.5	17.3	13.5	77.6	64.5	-13.1
10	41.0	35.5	8.5	5.5	11.0	9.0	60.5	50.0	-10.5
11	35.0	44.5	10.2	8.5	12.7	13.0	57.9	66.0	+ 8.1
12	47.0	40.5	13.8	8.5	17.3	13.5	78.1	62.5	-15.6
13	40.3	50.5	9.0	9.5	17.3	22.5	66.6	82.5	+15.9
14	38.7	56.0	10.5	5.0	17.0	16.0	66.2	77	+10.8
							943.0	916.5	-26.5

VI. CONCLUSIONS

The preceding chapters have presented and discussed the field test of the Willy Whistle public education messages for children in terms of exposure, knowledge and behavior changes in the target population and accident reductions. The specific results reported and the overall pattern of results leads to several conclusions which are presented below.

A. Exposure

There is no widely accepted benchmark against which to assess the exposure of public service television spots or classroom films. It has been, however, a generally held belief that public service announcements (PSAs) could not generate enough air time to impact significantly on a target audience. This study clearly dispels that belief. The Willy Whistle materials were played frequently as shown by the monitoring conducted in the test cities and by the unaided recall of the children. Moreover, the Willy Whistle spots are still being played on at least one major station (KNBC) in Los Angeles. Their report for 1982 indicated that Willy Whistle received air time worth $25,475 on their station during that year. This is extraordinary exposure of the spots given that the project ended in 1978 in Los Angeles and there has been virtually no contact with the station since then.

While the success of the Willy Whistle TV spots in gaining air time was significant, it cannot be concluded that PSAs in general will be aired. The Willy Whistle materials were unique in at least four ways. First, they were the product of an extensive research effort which was designed to uncover the most critical behavioral errors in the Dart-Out accidents and replace them with simple remedial behaviors. The process employed was innovative, and it has been concluded (see Volume I of this report) that the process itself contributed significantly to the overall success of the endeavor. Second, the Willy Whistle PSAs were produced with extreme care and a dedication to quality not typically found in PSAs. This made them attractive to public service directors and certainly increased their exposure. Few producers of PSAs have the available resources to prepare materials of the quality of Willy Whistle.

A third way in which the Willy PSAs were unique or at least different from the majority of public service messages is that they spoke directly to children. Many PSAs talk to parents about children, but Willy talked to children. This permitted station directors to program the Willy Whistle spots in "prime" time for young children, e.g., with early morning cartoon shows. There is little competition for public service time at these hours. This permitted the stations to air a significant amount of public service material without utilizing the more coveted evening hours and without relegating the materials to the post-midnight "graveyard" into which many PSAs are placed.

Finally, Willy Whistle garnered air time because the materials were distributed directly to the stations in person with a detailed explanation of the need for them and their role in the field test. Follow-up discussions with station personnel indicated that this played a major role in the reception given Willy Whistle. Spots distributed through the mail simply are not received as warmly as those presented in person. One member of this project was present at a station when the public service director threw a newly delivered public service announcement from a Federal agency in the trash without even opening it. It must be concluded, however, that this personal touch is not sufficient to overcome severe competition for PSA time. The distribution of adult materials for this study (Volume III) was handled in exactly the same fashion as the Willy Whistle PSAs. However, the English language adult spots were competing for air time with most of the other PSAs in the test markets including numerous local fund raising activities. As a result, they did not receive a response which was even close to that which Willy Whistle enjoyed.

It is clear that few public education efforts will have the luxury of using trained researchers and media creators to distribute materials to stations. However, there are several other ways to accomplish personalization of distribution without long distance travel and extensive costs. These include using local action groups or task forces who have an interest in the subject area. Parent groups in schools are one potentially excellent source of volunteer time to distribute safety-related PI&E materials. Their obvious concern for children and their local residency tend to promote the cooperation of the media.

The observed use patterns of the Willy Whistle classroom film also lead to several conclusions. First, children who saw it obviously remembered it well enough to cite it in the unaided recall questions and well enough to learn from it. Therefore, there was "sufficient" exposure to spawn the knowledge, behavior and accident effects observed. However, a second conclusion must be that the use of the film was suppressed when left solely to the discretion of the classroom teacher. On the other hand, when a central school safety group actively promoted the use of Willy as in Los Angeles where it was scheduled into classrooms or Milwaukee where it was shown on in-school TV, exposure increased significantly. It is believed that this result is less an outgrowth of resistance to Willy Whistle than it is a lack of conscious effort on the part of teachers to seek material on pedestrian safety. Without prompting, most teachers would likely prefer not to go to the trouble of securing a projector and interrupting instruction to show a 6 or 7 minute film. Moreover, there is anecdotal evidence that the teachers felt unprepared to discuss pedestrian safety and were therefore reluctant to open the topic in the classroom. It therefore seems reasonable to attempt to make longer films so that teachers will consider it worthwhile to go to the trouble of showing them. It also appears important to attempt to include a teacher's guide with the film in even more detail than those used during this study and shown in Appendix A so that teachers feel more prepared.

The distribution of classroom exposures by grade level also leads to several observations. Although Willy Whistle was designed for a 5-9 year old primary audience, it had its major impact on 3-7 year olds. Moreover, despite pretest indications that even 10-12 year olds would watch and learn from it, there was an obvious reluctance among fifth and sixth grade teachers to use the film. Perhaps this was because they believed animated characters were too juvenile for their students. Several teachers certainly mentioned this in follow-up discussions. Alternatively, they may have believed that their students typically encountered traffic situations which were much more complex that the quiet, residental street crossings depicted in Willy Whistle. This suggested the need for a follow-up film which covers with the basic advice and extends it to the more complex locations older children begin to encounter when they leave the shelter of their neighborhoods. As a result, a film entitled "And Keep on Looking" was prepared by Dunlap and Associates East, Inc.

under a subsequent contract with NHTSA (DTNH22-80-C-07475). It was specifically designed to pick up where the Willy Whistle materials left off.

B. Knowledge

The results of the in-school knowledge test clearly showed an increase in safe street crossing knowledge among children exposed to Willy Whistle. It must therefore be concluded that there was an increase in knowledge sufficient to account for the observed changes in behavior and accidents. Moreover, it can only be reasonably concluded that the observed knowledge changes were a result of Willy Whistle for two reasons. First, the greatest knowledge gains were related to looking left-right-left and crossing near parked cars. These are behaviors which were only presented in Willy Whistle and not in any other safety program in existence at the test sites during the program period. Second, the unaided and the aided recall of Willy Whistle, both as a character and as a source of safety information, leave little doubt that the improvement in safe street crossing knowledge came from the materials being tested.

It is also worth noting that the new and obviously more novel behavioral information of searching left-right-left rather than the traditional "look both ways" and the specific parked car crossing advice in lieu of a strong implied prohibition on crossing near parked cars, were attended to best by the target audiences. The more traditional and mundane advice to stop at the curb appeared to promote less of a response as measured by the classroom survey. This suggests that children listen to and recall novel messages better than traditional ones. It also is likely that the novelty of the search and parked car parts of the message made them more likely to be verbalized during the survey than the more universally accepted course message ("stop at the curb").

C. Behaviors

Child pedestrian crossing behaviors measured in this study definitely improved indicating that the knowledge imparted was employed by some of the target audience and suggesting that accident reductions were possible. Nevertheless, the overriding conclusion of this study related to child street crossing behavior is that it is abysmal. Given the extremely low rate of "correct" crossing sequences even after the application of Willy Whistle, it is surprising that there are not more child pedestrian accidents. Since behavior did improve and accidents were reduced, it is reasonable to conclude that child pedestrian accidents and street crossing behaviors are related. However, the relatively low rate of accidents given the poor observed behaviors leads to several reasonable conjectures.

First, in order to amass a sufficient sample of observed crossings, children were viewed after school dismissals as they dispersed for home and in the neighborhoods immediately surrounding their school. These were not the typical conditions for the occurrence of Dart-Out accidents, but there was no other reasonable means of obtaining a large sample of observed crossings. Therefore, the results of the behavior observations likely understate correct behaviors. Children in groups or under the protective umbrella of the trip home from school may be expected to feel safer than when they are alone. This could easily result in poor crossing behavior due to a reliance on "external" protection.

Second, the accident analyses of Snyder and Knoblauch (1971) which uncovered the Dart-Out accident types likely led to an underestimation of the role of the driver in avoiding these types of accidents. When an accident of this type occurs, a short time exposure is generated which prevents the driver, who is often looking for pedestrian threats, from detecting them. Simultaneously, the pedestrian is prevented from detecting the car, but the data collected by this study indicate that this detection failure may be moot since the child pedestrian rarely searches for vehicular threats in the first place. This combination of extremely poor pedestrian behavior and a lower than expected accident rate suggests that drivers do compensate quite often to avoid Dart-Out accidents. Most often, it is only when there is true short time exposure which eliminates the driver's ability to respond to avoid an accident do crashes actually occur.

A third possibility is that children, contrary to the belief held at the outset of this study and promoted by the work of Blomberg and Preusser (1975), probably do some significant searching with peripheral vision and eye movements. Therefore, the observation of overt head turns as a search measure for this study was likely overly conservative, i.e., it tended to understate the amount of visual searching actually taking place. Notwithstanding this conclusion, however, searching for traffic by turning one's head is still considered the optimum search modality for pedestrians and was certainly the behavior displayed in the Willy Whistle messages. Thus, the measured search behavior is considered the best representation of maximally safe behaviors.

Fourth, poor observed search behavior may also have resulted from a reliance by the pedestrians on auditory rather than visual cues. While auditory cues are valuable, particularly in the presence of visual screens, they simply are not a substitute for adequate searching. Even when a pedestrian's view is blocked, it is possible to proceed to the edge of the visual screen and search around it. This behavior will most surely provide a greater safety margin than solitary reliance on auditory cues.

Finally, the present study provides no evidence that showing midblock crossings in the Willy Whistle film actually increased the incidence of midblock crossings. In fact, the behavioral observation data reported in Chapter IV tend to confirm just the opposite effect as noted previously by Blomberg and Preusser (1975). While the Willy Whistle films depict midblock crossings, they never actually instruct children on where to cross the street. Rather, they are totally devoted to presenting information on how to cross. Thus, it is not unreasonable to expect no change in the rate of midblock crossings. The observed decrease of midblock crossings in favor of those at intersections is, however, unexpected. It is possible that presenting new pedestrian safety advice (stop, L-R-L) to children prompted them to recall previous pedestrian teachings ("cross at the green") and integrate the total set of advice.

D. Accidents

The results presented in Chapter V lead to the inescapable conclusion that the Willy Whistle messages are capable of reducing the incidence of child Dart-Out accidents. A statistically significant accident reduction was observed in each of the three test cities. Overall, it would appear that approximately 20% of the targetted types among children in the critical age ranges were eliminated after the Willy Whistle materials were released.

The accident reductions observed were greater among younger children (3-7 years old) than in older ages even though the a priori target group for the materials was 5-9 year olds. This finding is consistent with the differential exposure by age reported in Chapter II and the conclusion stated earlier that younger children were more likely to have seen the Willy Whistle materials than their older counterparts. This finding does not detract from the success of the tested materials but rather suggests that they be used for children under the age of 9 or 10 and then supplanted by new materials targetted more specifically for older children.

Overall, it must be concluded that the Willy Whistle materials (TV spots, classroom film and poster) are viable, cost-effective pedestrian accident countermeasures. The reduction of 5.5 accidents per month reported for Los Angeles alone in Chapter V would be sufficient to repay all of the development and test costs for this entire project (including the adult messages discussed in Volume III) in less than 18 months assuming an extremely conservative cost to society of $10,000 for a child pedestrian injury accident. Since somewhat similar reductions were achieved in Columbus and Milwaukee, it may be concluded that the Willy Whistle materials have already yielded a net "profit" to society just from the test cities.

Finally, the reader is cautioned against indiscriminately extending the success of Willy Whistle to other public education campaigns in general or even to those directed at children. As discussed in Volume I, the authors have concluded that the process itself from which the Willy Whistle materials emerged played a vital role in their success. However, even that process is not sufficient to guarantee a successful education program. The results presented in Volume III for the adult messages show that forces external to the development effort but inherent in the presentation of public service media may render even the most carefully prepared materials ineffective. Nevertheless, it is fair to conclude that under the right conditions of development and presentation public education can be a viable pedestrian accident countermeasure, and that the successes experienced in the pedestrian domain might reasonably be replicated in analogous areas such as bicycle safety.

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APPENDIX A.

Willy Whistle TV Spot Photo Boards

and

Long Film Digest Sheets

U.S. Department
of Transportation

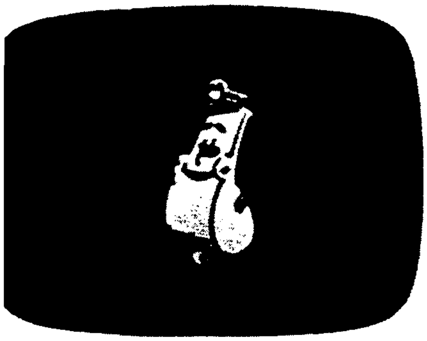
National Highway Traffic Safety Administration

"WILLY WHISTLE"

TITLE: "The Whole Story"
LENGTH: :60

PEDESTRIAN SAFETY

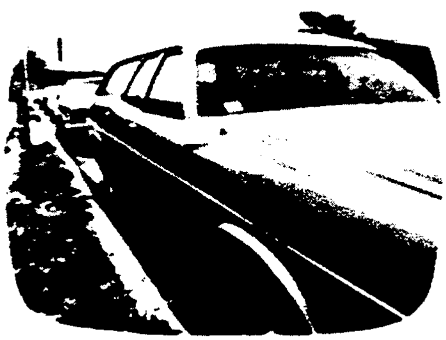
CONTRACT #DOT-HS-4-00952



WILLY (SYNC): Hi, I'm Willy Whistle, with an important message about crossing streets. There are only three things to remember:

WILLY (VO): First...always stop at the curb before you go off the sidewalk.

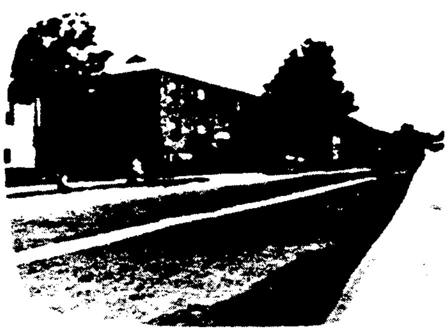
Second...after you stop at the curb, always look to the left, and to the right and to the left again, till there are no cars coming.



Third...What do you do if there are cars parked on the street? You stop at the curb but you can't really see if a car is coming or not. It's kind of different, isn't it?

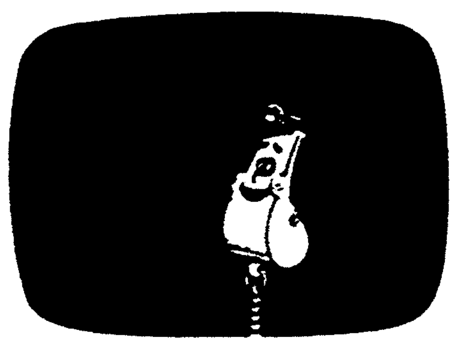
Now, if cars are parked on the street, always go to the edge of the parked cars where you can see.

If you see a car coming from *any* direction, wait till it passes, and then...



look left, right and left again...

till there are no cars coming each time you look.



WILLY (SYNC): It's one *good* way to avoid accidents and you make it work.

U.S. Department
of Transportation

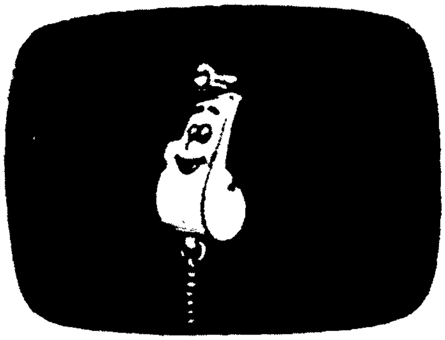
**National Highway
Traffic Safety
Administration**

"WILLY WHISTLE"

TITLE: "Reinitiation"
LENGTH: :60

PEDESTRIAN SAFETY

CONTRACT #DOT-HS-4-00952



WILLY (SYNC): Hi, I'm Willy Whistle, with an important message about crossing streets.

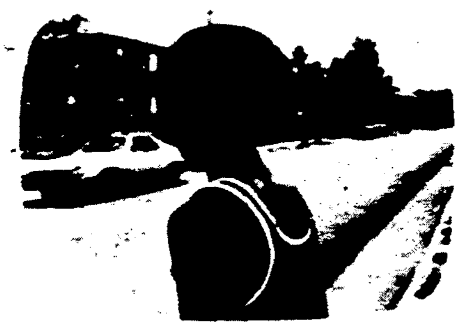
WILLY (VO): Laura and Woody and Billy are friends of mine because they know the right way to cross streets...

First, stop at the curb...

Then you look to the left...to the right...and to the left again. Until you're sure no cars are coming.

You stop at the curb and look to the left...to the right...and to the left again. But now there's a car there, so you wait till it passes, and start all over again.

You look to the left...to the right...and to the left again. Now it's clear, and you're okay.



If you see a car coming from any direction, wait till it passes, and then look left, right and left again till there are no cars coming each time you look.

LAURA: It isn't so hard, is it?

WILLY (SYNC): It's one *good* way to avoid accidents and you make it work.

U.S. Department
of Transportation

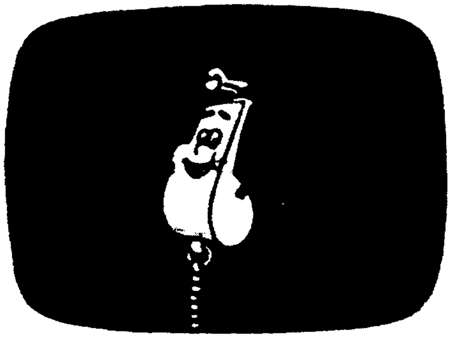
**National Highway
Traffic Safety
Administration**

"WILLY WHISTLE"

TITLE: "Curbs and Parked Cars"
LENGTH: :60

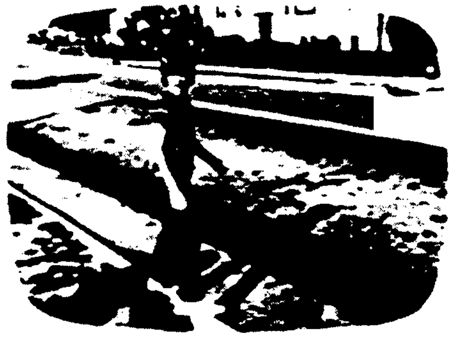
PEDESTRIAN SAFETY

CONTRACT # DOT-HS-4-00952



WILLY (SYNC): Hi...I'm Willy Whistle, with an important message about crossing streets...

WILLY (VO): Laura...what do you do whenever you come to a curb?
LAURA: You *stop!*



WILLY (VO): Billy, what do you do when you come to a curb?
BILLY: You *stop!*

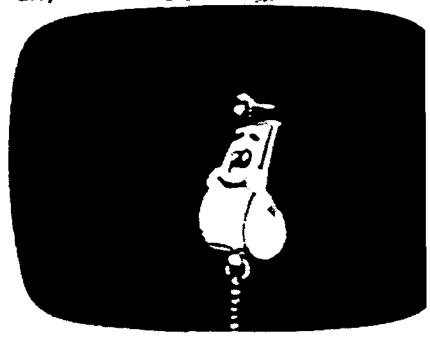
WILLY (VO): Woody, what do you do when you come to a curb?
WOODY: You *stop!*
WILLY (VO): You're absolutely right. There may be cars coming and you *don't want them to hit you.*

WILLY (SYNC): What do you do if there are cars parked on the street?

WOODY (VO): After I stop at the curb, I go out to the edge of the parked cars, and look left, right, left, and if I see a car coming, step back till it passes, then left, right, left again till I don't see any more cars coming.

WILLY (VO): If cars are parked on the street, always go to the edge of the parked cars where you can see...

and stop before looking left, right and left.



WILLY (SYNC): It's one *good* way to avoid accidents and you make it work.

U.S Department
of Transportation

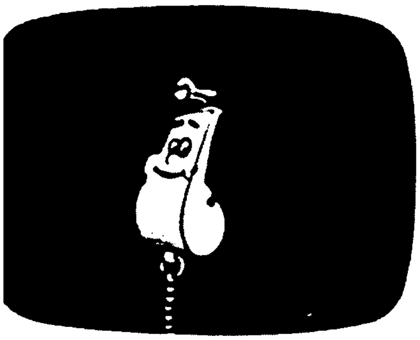
**National Highway
Traffic Safety
Administration**

"WILLY WHISTLE"

PEDESTRIAN SAFETY

TITLE: "Parked Cars"
LENGTH: :30

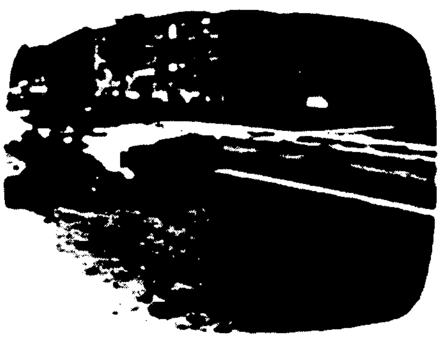
CONTRACT #DOT-HS-4-00952



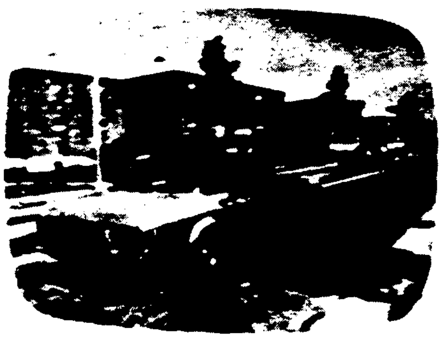
WILLY (SYNC): Hi, I'm Willy Whistle, with an important message about crossing streets.

WILLY (VO): Always stop at the curb...

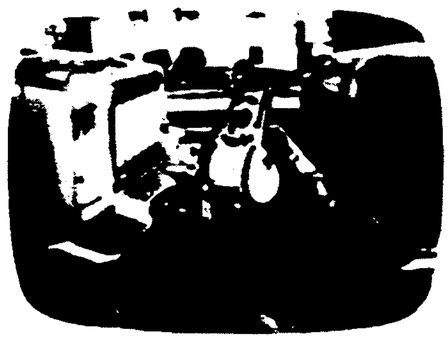
before you go off the sidewalk.



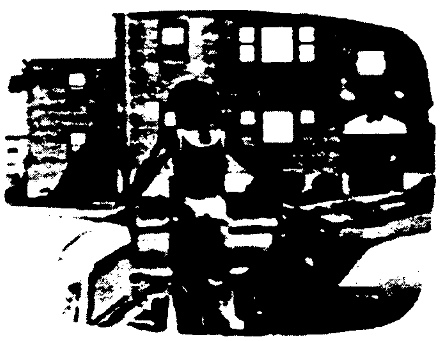
There may be cars coming...



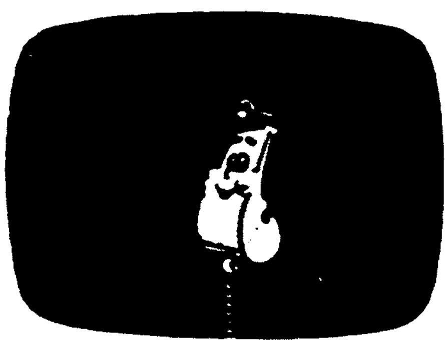
...and you don't want them to hit you.



WILLY (SYNC): Woody, would you show us what to do if there are cars parked on the street?



WOODY (VO): After I stop at the curb, I go out to the edge of the parked cars and look left, right, left again till I don't see any more cars coming.



WILLY (SYNC): It's one *good* way to avoid accidents and you make it work.

U.S. Department
of Transportation

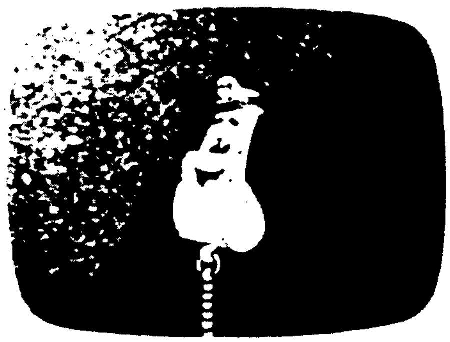
**National Highway
Traffic Safety
Administration**

"WILLY WHISTLE"

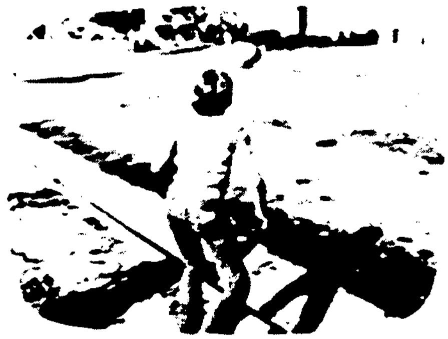
TITLE: "Curbs"
LENGTH: :30

PEDESTRIAN SAFETY

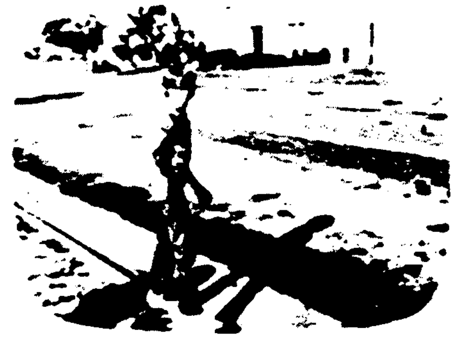
CONTRACT #DOT-HS-4-00952



WILLY (SYNC): Hi, I'm Willy Whistle with an important message about crossing streets.



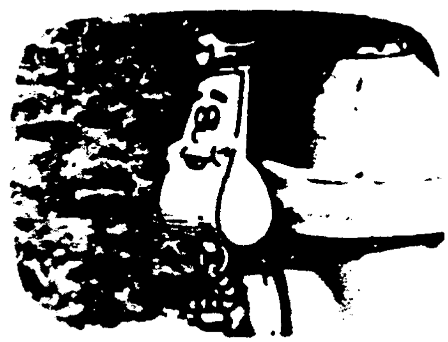
WILLY (VO): Billy, what do you do when you come to a curb?



BILLY: You *stop!*

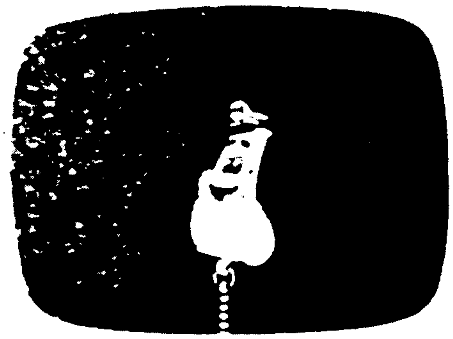
WILLY (VO): Laura, what do you do whenever you come to a curb?

LAURA: You *stop!*



WILLY (SYNC): Correct! When you come to the curb, you *stop*. Always?

BILLY: Every time!



WILLY (SYNC): You're *absolutely* right. You don't go into the street till you're sure no cars are coming. It's one *good* way to avoid accidents and you make it work.

U.S. Department of Transportation

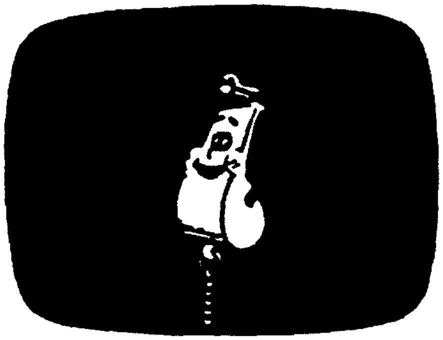
National Highway Traffic Safety Administration

"WILLY WHISTLE"

TITLE: "Search"
LENGTH: :30

PEDESTRIAN SAFETY

CONTRACT #DOT-HS-4-00952



WILLY (SYNC): Hi, I'm Willy Whistle, with an important message about crossing streets.

WILLY (VO): Always stop at the curb before you go off the sidewalk.

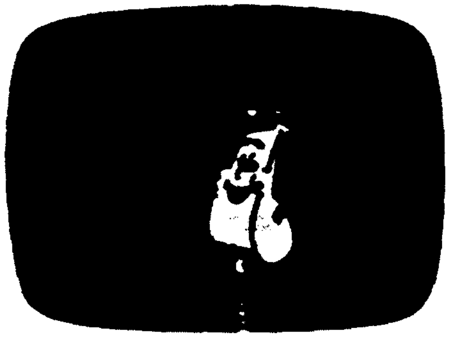
Always look to the left and...

to the right and...

to the left again till there are no cars coming.

Look left, right and...

left again till there are no cars coming each time you look.



WILLY (SYNC): It's one good way to avoid accidents and you make it work.

Introduction to WILLY WHISTLE Film

TITLE:	WILLY WHISTLE (6 minutes, 22 seconds)
SUBJECT:	Pedestrian Safety
AUDIENCE:	Grades K - 6
SPONSOR:	U.S. Department of Transportation National Highway Traffic Safety Administration

Children of elementary school age are involved in pedestrian accidents at a rate which is two to three times greater than the average for all other ages. This is true even though much effort has been expended to teach children where to cross the street safely. Therefore, an extensive analysis of thousands of accidents was conducted to determine why children continue to be struck by cars.

This analysis showed that:

- Children are generally struck in their own residential neighborhoods
- Marked crosswalks, policemen, crossing guards and traffic lights are not often available in these neighborhoods to help a child cross safely
- Approximately 68% of children struck are in or entering the road at non-intersection locations. In about 43% of these accidents, the driver's view was obscured by a parked vehicle between him and the child.

Above all, regardless of where the child entered the street, accident accounts indicated that virtually none of the involved children stopped and looked for cars before entering the traveled portion of the roadway. Moreover, several thousand observations of children crossing the street showed that almost 95% failed to stop and look both ways before crossing.

The film WILLY WHISTLE is based on these extensive analyses of child accidents and crossing behavior. It instructs children to:

- Always stop at the curb or outside edge of a parked car before entering the street. This gives the child time to look and provides oncoming drivers with time to see and avoid the child.

- Look left, right and left after stopping until no cars are coming each time they look. If a car is seen, the child is cautioned to look left, right and left again until no cars are coming. This sequence insures that the child looks both ways, and has looked left (towards the most immediate threat) first and last. This sequence is particularly safe because it instructs the child to cross only when no moving cars are seen in each direction. It is also realistic because young children alone are generally crossing the street in quiet residential neighborhoods and can wait for a completely clear street.

WILLY WHISTLE shows children what to do with their eyes and feet whenever and wherever they cross the street. If stopping and looking become a consistent part of a child's street crossing behavior, fewer accidents will occur. This film teaches

Long Film Digest Sheet as Used in Los Angeles these behaviors in a typical street situation with which children can identify. It stresses how to cross rather than where to cross because traffic lights, marked crosswalks, etc., are not often found at the typical locations where children frequently cross alone.

Previous safety programs have been directed primarily at telling children where to cross the street. WILLY WHISTLE augments these programs by teaching children how to cross a street. This advice will help a child cross safely whether or not he has chosen a good crossing location.

Please let WILLY WHISTLE help you improve the safety of your children by showing him often and reiterating his advice in your discussions.

Suggested Discussion/Review Questions:

1. What is the first thing you should always do before crossing the street?

   Answer: STOP AT THE CURB.

2. What is the next thing to do before crossing the street?

   Answer: LOOK LEFT - RIGHT - LEFT UNTIL I SEE NO CARS COMING ON EACH LOOK.

3. When you look for cars and you see one coming from any direction, what should you do before crossing the street?

   Answer: LET THE CAR PASS. LOOK LEFT - RIGHT - LEFT ALL OVER AGAIN UNTIL YOU SEE NO CARS COMING ON EACH LOOK.

4. What should you do before crossing the street when there are parked cars near you?

   Answer: STOP AT THE CURB. THEN GO TO THE OUTSIDE EDGE OF THE PARKED CARS AND STOP. THEN LOOK LEFT - RIGHT - LEFT UNTIL YOU SEE NO CARS COMING ON EACH LOOK.

NOTE:

The film and this digest have been prepared by Dunlap and Associates, Inc., One Parkland Drive, Darien, Connecticut 06820 under Contract No. DOT-HS-4-00952 to the National Highway Traffic Safety Administration.

Long Film Digest Sheet as Used in Los Angeles (concluded)

Introduction to WILLY WHISTLE Film

TITLE:	WILLY WHISTLE (6 minutes, 36 seconds)
NUMBER:	Milwaukee Museum Catalog No. 77544
SUBJECT:	Pedestrian Safety
AUDIENCE:	Grades K - 6
SPONSOR:	U.S. Department of Transportation National Highway Traffic Safety Administration

Children of elementary school age are involved in pedestrian accidents at a rate which is two to three times greater than the average for all other ages. This is true even though much effort has been expended to teach children where to cross the street safely. Therefore, an extensive analysis of thousands of accidents was conducted to determine why children continue to be struck by cars.

This analysis showed that:

- Children are generally struck in their own residential neighborhoods
- Marked crosswalks, policemen, crossing guards and traffic lights are not often available in these neighborhoods to help a child cross safely
- Approximately 68% of children struck are in or entering the road at non-intersection locations. In about 43% of these accidents, the driver's view was obscured by a parked vehicle between him and the child.

Above all, regardless of where the child entered the street, accident accounts indicated that virtually none of the involved children stopped and looked for cars before entering the traveled portion of the roadway. Moreover, several thousand observations of children crossing the street showed that almost 95% failed to stop and look both ways before crossing.

The film WILLY WHISTLE is based on these extensive analyses of child accidents and crossing behavior. It instructs children to:

- Always stop at the curb or outside edge of a parked car before entering the street. This gives the child time to look and provides oncoming drivers with time to see and avoid the child.

- Look left, right and left after stopping until no cars are coming each time they look. If a car is seen, the child is cautioned to look left, right and left again until no cars are coming. This sequence insures that the child looks both ways, and has looked left (towards the most immediate threat) first and last. This sequence is particularly safe because it instructs the child to cross only when no moving cars are seen in each direction. It is also realistic because young children alone are generally crossing the street in quiet residential neighborhoods and can wait for a completely clear street.

WILLY WHISTLE shows children what to do with their eyes and feet whenever and wherever they cross the street. If stopping and looking become a consistent part of a child's street crossing behavior, fewer accidents will occur. This film teaches

Long Film Digest Sheet as Used in Milwaukee these behaviors in a typical street situation with which children can identify. It stresses how to cross rather than where to cross because traffic lights, marked crosswalks, etc., are not often found at the typical locations where children frequently cross alone.

Previous safety programs have been directed primarily at telling children where to cross the street. WILLY WHISTLE augments these programs by teaching children how to cross a street. This advice will help a child cross safely whether or not he has chosen a good crossing location.

Please let WILLY WHISTLE help you improve the safety of your children by showing him often and reiterating his advice in your discussions.

Suggested Discussion/Review Questions:

1. What is the first thing you should always do before crossing the street?

   Answer: STOP AT THE CURB.

2. What is the next thing to do before crossing the street?

   Answer: LOOK LEFT - RIGHT - LEFT UNTIL I SEE NO CARS COMING ON EACH LOOK.

3. When you look for cars and you see one coming from any direction, what should you do before crossing the street?

   Answer: LET THE CAR PASS. LOOK LEFT - RIGHT - LEFT ALL OVER AGAIN UNTIL YOU SEE NO CARS COMING ON EACH LOOK.

4. What should you do before crossing the street when there are parked cars near you?

   Answer: STOP AT THE CURB. THEN GO TO THE OUTSIDE EDGE OF THE PARKED CARS AND STOP. THEN LOOK LEFT - RIGHT - LEFT UNTIL YOU SEE NO CARS COMING ON EACH LOOK.

NOTE:

The film and this digest have been prepared by Dunlap and Associates, Inc., One Parkland Drive, Darien, Connecticut 06820 under Contract No. DOT-HS-4-00952 to the National Highway Traffic Safety Administration.

Long Film Digest Sheet as Used in Milwaukee (concluded)

Introduction to MEET WILLY WHISTLE Film

TITLE:	MEET WILLY WHISTLE (6 minutes, 32 seconds)
SUBJECT:	Pedestrian Safety
AUDIENCE:	Grades K - 6
SPONSOR:	U.S. Department of Transportation National Highway Traffic Safety Administration

Children of elementary school age are involved in pedestrian accidents at a rate which is two to three times greater than the average for all other ages. This is true even though much effort has been expended to teach children where to cross the street safely. Therefore, an extensive analysis of thousands of accidents was conducted to determine why children continue to be struck by cars.

This analysis showed that:

- Children are generally struck in their own residential neighborhoods.
- Marked crosswalks, policemen, crossing guards and traffic lights are not often available in these neighborhoods to help a child cross safely.
- Approximately 68% of children struck are in or entering the road at non-intersection locations. In about 43% of these accidents, the driver's view was obscured by a parked vehicle between him and the child.

Above all, regardless of where the child entered the street, accident accounts indicated that virtually none of the involved children stopped and looked for cars before entering the traveled portion of the roadway. Moreover, several thousand observations of children crossing the street showed that almost 95% failed to stop and look both ways before crossing.

The film WILLY WHISTLE is based on these extensive analyses of child accidents and crossing behavior. It instructs children to:

- Always stop at the curb or outside edge of a parked car before entering the street. This gives the child time to look and provides oncoming drivers with time to see and avoid the child.

- Look left, right and left after stopping until no cars are coming each time they look. If a car is seen, the child is cautioned to look left, right and left again until no cars are coming. This sequence insures that the child looks both ways, and has looked left (towards the most immediate threat) first and last. This sequence is particularly safe because it instructs the child to cross only when no moving cars are seen in each direction. It is also realistic because young children alone are generally crossing the street in quiet residential neighborhoods and can wait for a completely clear street.

WILLY WHISTLE shows children what to do with their eyes and feet whenever and wherever they cross the street. If stopping and looking become a consistent part of a child's street crossing behavior, fewer accidents will occur. This film teaches these behaviors in a typical street situation with which children can identify. It stresses how to cross rather than where to cross because traffic lights, marked crosswalks, etc., are not often found at the typical locations where children frequently cross alone.

Previous safety programs have been directed primarily at telling children where to cross the street. WILLY WHISTLE augments these programs by teaching children how to cross a street. This advice will help a child cross safely whether or not he has chosen a good crossing location.

Long Film Digest Sheet as Used in Columbus

Please let WILLY WHISTLE help you improve the safety of your children by showing him often and reiterating his advice in your discussions.

Suggested Discussion/Review Questions:

1. What is the first thing you should always do before crossing the street?

   Answer: STOP AT THE CURB.

2. What is the next thing to do before crossing the street?

   Answer: LOOK LEFT - RIGHT - LEFT UNTIL YOU SEE NO CARS COMING ON EACH LOOK.

3. When you look for cars and you see one coming from any direction, what should you do before crossing the street?

   Answer: LET THE CAR PASS. LOOK LEFT - RIGHT - LEFT ALL OVER AGAIN UNTIL YOU SEE NO CARS COMING ON EACH LOOK.

4. What should you do before crossing the street when there are parked cars near you?

   Answer: STOP AT THE CURB. THEN GO TO WHERE YOU CAN JUST SEE AROUND THE OUTSIDE EDGE OF THE PARKED CARS AND STOP. THEN LOOK LEFT - RIGHT - LEFT UNTIL YOU SEE NO CARS COMING ON EACH LOOK.

5. Do you still have to stop and look left - right - left when you have a green light or "Walk" signal?

   Answer: YES! CARS CAN BE TURNING ACROSS YOUR PATH EVEN WHEN YOU HAVE A GREEN LIGHT OR WALK SIGNAL. ALSO, DRIVERS SOMETIMES GO THROUGH A RED LIGHT, ESPECIALLY WHEN IT HAS JUST CHANGED.

6. What if there is no curb on my street?

   Answer: IT IS IMPORTANT TO STOP BEFORE REACHING THE STREET WHERE CARS ARE ALLOWED TO DRIVE. IF THERE IS NO CURB, STOP BEFORE THE EDGE OF THE STREET.

7. Is it safe to run when you cross a street?

   Answer: YOU SHOULD NEVER RUN OR WALK INTO THE STREET UNTIL YOU HAVE STOPPED AND LOOKED LEFT - RIGHT - LEFT UNTIL NO CARS ARE COMING ON EACH LOOK. RUNNING CAN PREVENT YOU FROM TAKING ENOUGH TIME TO LOOK LEFT - RIGHT - LEFT UNTIL YOU SEE NO CARS COMING.

8. Where can you and your parents get more materials on how to walk safely?

   Answer: THE AMERICAN AUTOMOBILE ASSOCIATION (AAA) HAS A NEW SERIES OF PAMPHLETS CALLED "PRESCHOOL CHILDREN IN TRAFFIC." THESE CAN BE OBTAINED FROM LOCAL AAA CLUBS.

NOTE:

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Long Film Digest Sheet as Used in Columbus (concluded)

APPENDIX B.

Accident Series Analyses

Summarized in this Appendix are the monthly accident series relevant to the effectiveness of the Willy Whistle safety program test described in the body of this report. There are described seven series for Los Angeles and the Northern California cities; six series for Columbus and for Cleveland-Dayton-Cincinnati; and seven series for Milwaukee and other urban Wisconsin areas.

Each series is presented in full and brief summaries of two types of analyses are also given.

Analysis of variance. Each accident series forms a rectangular year by month matrix. This was analyzed by a standard two-way anova procedure. Because the data were collected according to a time sequence, it is unlikely that all the assumptions of data independence which anova requires are met. However, the main effect and interaction terms of the anova are useful descriptors of the data and provide guidelines for the interpretation of subsequent analyses. Specifically:

- o The year x month interaction mean square is a rough estimate of the residual squared standard error in a good-fitting time series model because the interaction term is an estimate of the variability in the monthly accident data after the year and month main effects are subtracted.

- o The month main effect F-ratio and its attendant significance level provide a measure of the strength of the seasonal cycles in the data--the tendency for accident rates to be consistently high or low during particular months or seasons of the year. A large month effect here means that an adequate time series model is likely to have to make major seasonal adjustments.

- o The year main effect F-ratio and significance level are preliminary estimates of whether the intervention has had an effect on accident rates. Although this test is general and not precisely aligned with the presence or absence of the intervention, a high F-ratio points to significant variation which may be correlated with the introduction of the intervention. Conversely, an F-ratio near or below 1.0 is an indication that it is highly unlikely that the intervention has had any impact.

Both main effect interpretations suffer when the meaningful intervention on/off periods do not precisely align with year boundaries.

Box-Jenkins time series analysis. Several kinds of models were fit to each accident time series. The adequacy of a time series model to fit its data is measured by two primary statistics: The residual standard error, a measure of the differences between the actual data and the data points predicted by the model; and the degree to which those differences, or residuals, have no time-dependent patterns. The residual standard error is shown as SE residual in the time series table. The time-independence of the residuals is labeled "Q"in the table; it is essentially a χ^2-measure of the first 25 or so lag correlations of the residual series. To evaluate the Q statistics, their degrees of freedom are shown along with the probability that the lag correlations could form a residual series without systematic time-dependent fluctuations.

In general, for better time series models, SE residual values should be low and Q values should be equal to or less than their degrees of freedom.

For each series, five types of "models" are summarized. The first two are simply initial descriptions of the accident data to aid the development of precise models. The remaining series are fitted to the data and provide specific information toward evaluating the Willy Whistle safety program.

- None--i.e., the original data series

- $(1-B^{12})$--i.e., the series formed by annual differencing --subtracting from each datum the datum for the same month in the preceding year (if known). The series is 12 data shorter than the original series is 12 data shorter than the original series.

- Baseline. A model fit to the accident data from all months prior to the safety program introduction is independent of the influence of the safety program. The forecast of accident data through the program period, when compared with the actual data, provides a direct estimate of how and how much accident occurrence rates changed (compared to the best predictions from known, i.e., baseline, data) during the program period. To the extent that large drops were seen in the program period for darts and dashes to children in the program period for darts and dashes to children in the program area and to the extent that there were no drops in comparison accident series (same location but different population or same population in other locations), program effectiveness could be inferred.

- All accidents. Similar to the baseline model, except fit to all the known accident data (baseline and program). To the extent that this model was similar to the preceding model, no program-period change was present. If the models had to be quite different, or if all the accident data could not fit well in a model, then there is evidence that the accident rates changed significantly during the program period. Because only accident data were involved in these models, however, inferences about program effectiveness were indirect.

- Intervention model--based on all accident data and a second, parallel, time series representing the presence or absence of the safety program. To the extent that an intervention model could be developed which fit the accident data well, and if that model included statistically significant transfer parameters from the safety program intervention series, direct evidence of program impact was present.

For each data series, several forms of time series models were investigated to find the ones which best described the accident data. Those models--their forms and parameter values--are shown below the summary tables. The goodness-of-fit statistics are given in the time series analysis table.

Los Angeles Pedestrian Accidents: Darts and Dashes to Children Ages 3-8.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	28	23	46	42	43	43	36	27	29	47	26	22	34.33
1974	23	38	29	37	49	49	30	37	27	27	26	28	33.33
1975	32	29	47	52	45	30	33	30	39	34	26	26	35.25
1976	26	21	31	31	43	37	34	27	18	39	28	26	30.08
1977	19	29	24	28	28	28	28	34	37	26	23	25	27.42
1978	25	17	23	44	41	34	35	32	22	25	15	20	27.75
Avg.	25.50	26.17	33.33	39.00	41.50	36.83	32.67	31.17	28.67	33.00	24.00	24.50	31.36

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	139.39	5	3.472	.009
Month	201.42	11	5.017	.000
Yr x Mon	40.14	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	8.492	76.69	24	.000
$(1-B^{12})$	10.008	44.14	24	.01
Base	5.277	24.28	20	.20
All Acc	7.48	35.93	22	.04
Int: W off/on	6.074	33.79	24	.09
Int: W-TV	6.890	35.09	24	.06

Models

Baseline: (38 months) $Y_t - 34.70 = (1 - .38B^2 - .33B^3 - .27^*B^5)(1 + .92B^{12})a_t$

All Accidents: $(1 - .46B)(Y_t - 31.31) = (1 - .25B^5)a_t$

Intervention: $Y_t = -2.280X_{t-2} - 5.347Z_{t-2} + \frac{(1 - .939B^{12})}{(1 - B^{12})}a_t$

X_t and Z_t = Willy off/on, see text p. 70)

Intervention: $Y_t = -.295X_{t-2} + \frac{(1.91B^{12})(1 + .34B)}{(1 - B^{12})}a_t$

*parameter not significant

Los Angeles Pedestrian Accidents:
Darts and Dashes to Children Ages 0-2, 9-14.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	10	9	15	18	13	22	14	15	11	19	9	10	13.75
1974	8	13	16	12	10	15	14	14	4	16	15	7	12.00
1975	7	10	4	21	19	15	17	6	16	12	10	11	12.33
1976	15	10	23	6	13	10	11	7	11	15	12	13	12.17
1977	5	6	11	15	14	16	14	10	13	5	12	7	10.67
1978	11	10	9	19	12	18	13	9	19	9	5	4	11.50
Avg.	9.33	9.67	13.00	15.17	13.50	16.00	13.83	10.17	12.33	12.67	10.50	8.67	12.07

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	12.48	5	.708	.622
Month	34.04	11	1.931	.055
Yr x Mon	17.63	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	4.451	20.07	25	n.s.
$(1B^{12})$	6.263	48.89	25	.01

(Series does not show sequential dependencies, so analysis is properly based on anova techniques.)

Los Angeles Pedestrian Accidents:
All Involving Children Ages 0-14.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	88	77	108	118	101	119	104	93	82	117	78	69	96.17
1974	80	101	88	108	111	116	87	94	75	88	97	75	93.33
1975	78	83	95	135	121	90	108	68	101	96	87	86	95.67
1976	106	74	104	83	106	96	104	91	71	114	92	98	94.92
1977	78	85	73	109	104	97	99	80	92	93	89	69	89.00
1978	84	71	86	113	113	117	95	85	97	86	87	64	91.50
Avg.	85.67	81.83	92.33	111.00	109.33	105.83	99.50	85.17	86.33	99.00	88.33	76.83	93.43

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	91.35	5	.673	.648
Month	763.28	11	5.624	.000
Yr x Mon	135.72	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	15.160	63.26	25	.000
$(1-B^{12})$	17.490	52.56	25	.001
Base	11.047	29.77	23	.20
All Acc	11.81	51.01	22	.001
Intervention	12.76	35.02	21	.03

Models

Baseline: $Y_t - 94.52 = (1 + .92B^{12})a_t$
(38 months)

All Accidents: $(1-B^{12})Y_t = 1.00^* + (1-.24^*B)(1-.92B^{12})a_t$

Intervention: $Y_t - 94.28 = -.91^*X_t + (1 + .35B^{11} + .11^*B^{12} + .53B^{13})a_t$
(X_t = Willy off/on)

*parameter not significant

Northern California Urban Pedestrian Accidents: All Involving Children Ages 3-8.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	14	26	27	20	35	22	30	19	15	24	15	20	22.25
1974	7	19	18	25	19	19	20	14	20	20	15	10	17.17
1975	11	9	22	27	33	21	26	16	24	17	17	20	20.25
1976	16	11	26	19	29	22	20	20	16	16	12	14	18.42
1977	14	21	25	17	31	20	16	17	12	23	16	15	18.92
1978	12	13	14	20	33	27	22	16	17	17	16	8	17.92
Avg.	12.33	16.50	22.00	21.33	30.00	21.83	22.33	17.00	17.33	19.50	15.17	14.50	19.15

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	40.48	5	2.471	.043
Month	134.71	11	8.222	.000
Yr x Mon	16.38	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	6.034	99.63	25	.000
$(1B^{12})$	5.995	37.94	25	.05
Base	5.056	16.09	22	n.s.
All Acc	4.827	24.67	22	>.30
Intervention	4.837	20.40	22	n.s.

Models

Baseline: $(1-.72B^{12})\ (Y_t-19.74) = (1+.43B^2)a_t$
(38 months)

All Accidents: $(1-.67B^{12})\ (Y_t-18.57) = (1+.40B^2)a_t$

Intervention: $(1-.66B^{12})\ (Y_t-19.77) = -.98^{*}X_t + (1+.38B^2)$
(X_t = Willy off/on)

*parameter not significant

Northern California Urban Pedestrian Accidents: All Involving Children Ages 0-14.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	25	38	41	34	49	30	45	27	23	38	24	27	33.42
1974	14	31	26	33	35	40	32	29	30	32	28	22	29.33
1975	22	21	34	42	50	41	47	29	36	29	32	36	34.92
1976	20	24	36	33	41	33	33	34	28	31	20	19	29.33
1977	26	33	34	32	40	31	37	34	30	40	27	25	32.42
1978	23	24	28	33	48	41	38	24	32	29	25	14	29.92
Avg.	21.67	28.50	33.17	34.50	43.83	36.00	38.67	29.50	29.83	33.17	26.00	23.82	31.56

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	67.36	5	2.759	.027
Month	239.86	11	9.826	.000
Yr x Mon	24.41	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	7.798	140.23	25	.000
$(1-B^{12})$	8.129	46.04	25	.01
Base	6.401	27.94	22	.19
All Acc	5.564	27.18	23	.20
Intervention	4.906	25.52	23	>.30

Models

Baseline: $(1-.78B^{12})(Y_t-33.45) = (1 + .42B^2)a_t$
(38 months)

All Accidents: $(1-B^{12})Y_t = (1-.20^*B^2)(1-.91B^{12})a_t$

Intervention: $(1-B^{12})Y_t = -.33^*X_t + (1 + .14^*B^2)(1 - .94B^{12})a_t$
(X_t = Willy off/on)

*parameter not significant

Los Angeles Pedestrian Accidents:
All Involving Adults (Ages 15+).

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	179	165	157	145	135	125	150	142	167	171	199	173	159.00
1974	225	154	151	147	125	165	139	167	132	156	191	209	163.42
1975	156	159	163	133	156	154	167	154	163	176	187	225	166.08
1976	196	187	177	170	143	165	158	180	179	213	185	217	180.83
1977	211	168	177	151	158	161	172	155	182	180	215	241	180.92
1978	254	237	222	178	183	165	170	187	195	205	221	234	204.25
Avg.	203.50	178.33	174.50	154.00	150.00	155.83	159.33	164.17	169.67	183.50	199.67	216.50	175.75

Analysis of Variance

Source	Mean Square	d.f.	F	p
Yr	3338.17	5	14.039	.000
Month	2751.50	11	11.571	.000
Yr x Mon	237.78	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	29.08	171.20	25	.000
$(1-B^{12})$	24.22	43.04	25	.02
Base	15.05	13.02	22	n.s.
All Acc	16.19	16.50	22	n.s.
Intervention	15.59	12.59	22	n.s.

Models

Baseline: (38 months) $(1 + .51B)(1 + .95B^{12})(1-B^{12})Y_t = 9.80 + a_t$

All Accidents: $(1-B^{12})Y_t = 8.41 + (1 + .35B^2)(1 - .90B^{12})a_t$

Intervention: $(1-B^{12})Y_t = 6.31X_t + .15^* + (1 + .32B^2)(1 - .91B^{12})a_t$
(X_t = Willy off/on)

*parameter not significant

Northern California Urban Pedestrian Accidents: All Involving Adults (Ages 15+).

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	50	51	46	37	33	37	39	31	55	53	68	45	45.42
1974	57	42	31	46	34	33	38	30	35	37	49	48	40.00
1975	40	58	48	42	58	46	48	41	37	60	59	61	49.83
1976	44	43	44	46	44	36	40	44	43	60	46	50	45.00
1977	45	47	50	41	38	43	32	47	53	73	63	67	49.92
1978	72	46	54	39	40	43	40	43	60	54	62	65	51.50
Avg.	51.33	47.83	45.50	41.83	41.17	39.67	39.50	39.33	47.17	56.17	57.83	56.00	46.94

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	221.46	5	3.928	.004
Month	291.07	11	5.163	.000
Yr x Mon	56.38	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	10.216	93.28	25	.000
$(1-B^{12})$	11.038	59.77	25	.000
Base	9.101	19.14	21	n.s.
All Acc	8.366	19.63	21	n.s.
Intervention	8.357	21.04	21	n.s.

Models

Baseline: $(1-.21^*B^{12})(Y_t - 45.00) = (1 + .30^*B)(1 + .38B^2)a_t$
(38 months)

All Accidents: $(1-.37B^{12})(Y_t - 47.42) = (1 + .35B)(1 + .42B^2)a_t$

Intervention: $(1 - .28B^{12})(Y_t - 44.83) = 2.74^*X_t + (1 + .36B)(1 + .46B^2)a_t$
(X_t = Willy off/on)

*parameter not significant

Columbus Pedestrian Accidents:
Darts and Dashes to Children Ages 3-8.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	5	7	10	18	11	12	10	10	11	10	6	5	9.58
1974	3	8	15	11	14	7	10	11	10	9	4	7	9.08
1975	5	4	13	16	18	15	13	13	8	14	6	4	10.75
1976	1	7	12	10	12	13	12	11	6	3	7	5	8.25
1977	1	1	8	13	10	11	7	6	5	7	4	7	6.67
1978	2	2	8	13	10	5	7	6	8	5	0	3	5.75
Avg.	2.83	4.83	11.00	13.50	12.50	10.50	9.93	9.50	8.00	8.00	4.50	5.17	8.35

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	41.81	5	8.401	.000
Month	69.22	11	13.908	.000
Yr x Mon	4.98	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	4.186	180.64	25	.000
(1-B12)	3.538	38.75	25	.05
Base	2.94	30.78	24	.16
Intervention	2.610	26.97	24	.31

Models

Baseline: (51 months) $Y_t = \frac{(1-.87B^{12})}{(1-B^{12})} a_t$

Intervention: $Y_t = 3.00X_{t-1} + \frac{(1-.92B^{12})}{(1-B^{12})} a_t$

Columbus Pedestrian Accidents:
Darts and Dashes to Children Ages 0-14.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	8	8	19	22	21	21	19	16	14	14	8	6	14.67
1974	4	11	19	15	21	12	17	15	12	14	8	8	13.00
1975	6	8	14	22	24	20	19	17	14	22	8	4	14.83
1976	1	11	14	17	17	18	17	18	14	8	7	9	12.58
1977	2	1	12	14	13	16	9	10	5	9	11	9	9.25
1978	2	2	11	19	15	10	13	9	10	7	0	3	8.42
Avg.	3.83	6.83	14.83	18.17	18.50	16.17	15.67	14.17	11.50	12.33	7.00	6.50	12.12

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	88.29	5	10.495	.000
Month	148.70	11	17.675	.000
Yr x Mon	8.41	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	5.981	216.14	25	.000
(1-B12)	4.685	53.45	25	.001
~~Base~~	~~3.230~~	~~34.00~~	~~22~~	~~.05~~
All Acc	3.189	20.29	21	n.s.
Intervention	3.110	18.31	22	n.s.

Models

Baseline: (51 months) $(1-B^{12})Y_t = -.80 + (1 + .17^*B)(1 - .88B^{12})a_t$

All Accidents: $(1-B^{12})Y_t = -1.27 + (1 + .22^*B)(1 - .18^*B^7)(1 - .92B^{12})a_t$

Intervention: $(1-B^{12})Y_t = -2.97X_{t-1} + (1 + .25^*B)(1 - .16^*B^7)(1 - .93B^{12})a_t$

*parameter not significant

Columbus Pedestrian Accidents:
All Involving Children Ages 0-14.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	21	25	43	42	37	39	34	24	19	28	20	19	29.25
1974	14	22	36	32	46	26	30	27	27	29	18	15	26.83
1975	19	18	24	31	41	32	30	33	23	37	14	6	25.67
1976	6	17	25	27	36	34	33	28	22	16	11	17	22.67
1977	3	5	19	26	36	26	16	17	16	23	22	15	18.67
1978	7	3	20	30	24	18	23	17	18	14	7	9	15.83
Avg.	11.67	15.00	27.83	31.33	36.67	29.17	27.67	24.33	20.83	24.50	15.33	13.50	23.15

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	314.35	5	11.910	.000
Month	375.98	11	14.245	.000
Yr x Mon	26.39	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	10.042	191.52	25	.000
$(1-B^{12})$	7.048	39.75	25	.05
Base	4.588	35.40	22	.05
All Acc	4.969	19.78	22	n.s.
Intervention	5.086	16.43	23	n.s.

Models

Baseline: (51 months) $(1-B^{12})Y_t = -2.67 + (1-.93B^7)(1-.89B^{12})N_t$

All Accidents: $(1-B^{12})Y_t = -2.67 + (1-.91B^{12})(1-.91B^{12})N_t$

Intervention: $(1-B^{12})Y_t = -4.86X_{t-1} + (1 + .34B)(1 - .94B^{12})N_t$

Cleveland-Dayton-Cincinnati Pedestrian Accidents:
All Involving Children Ages 5-9.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1974	16	31	39	54	45	67	30	30	47	52	29	37	39.75
1975	29	21	34	48	55	43	36	33	39	40	25	27	35.83
1976	15	23	46	47	55	56	37	34	42	40	24	25	37.00
1977	7	17	45	43	61	51	32	39	40	37	23	16	34.25
1978	6	22	39	50	52	51	31	24	42	29	21	23	32.50
Avg.	14.60	22.80	40.60	48.40	53.60	53.60	33.20	32.00	42.00	39.60	24.40	25.60	35.87

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	90.94	4	2.799	.037
Month	791.79	11	24.373	.000
Yr x Mon	32.49	44		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	13.343	187.30	25	.000
$(1-B^{12})$	7.451	21.20	25	n.s.
Base	6.548	15.84	22	n.s.
All Acc	6.026	14.70	22	n.s.
Intervention	4.888	14.68	24	n.s.

Models

Baseline: (39 months) $(1-B^{12})Y_t = -1.54 + (1-.60B^5-.43B^{12})a_t$

All Accidents: $(1-B^{12})Y_t = 1.66 + (1-.26B^5-.69B^{12})a_t$

Intervention: $(1-B^{12})Y_t = -1.89^*X_{t-2} + (1-.94B^{12})a_t$

*parameter not significant

Cleveland-Dayton-Cincinnati Pedestrian Accidents:
All Involving Children Ages 0-14.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1974	27	42	74	91	82	108	83	69	82	83	58	57	71.33
1975	47	33	56	74	104	85	71	67	72	74	53	43	64.92
1976	41	44	79	104	97	105	81	72	76	69	50	40	71.50
1977	15	37	71	82	102	95	72	67	78	60	48	31	63.17
1978	12	42	62	82	86	88	62	56	76	59	48	42	59.58
Avg.	28.40	39.60	68.40	86.60	94.20	96.20	73.80	66.20	76.80	69.00	51.40	42.60	66.10

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	327.06	4	5.336	.002
Month	2361.47	11	38.528	.000
Yr x Mon	61.29	44		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	22.536	285.75	25	.000
$(1-B^{12})$	12.164	35.76	25	.08
Base	10.287	24.75	21	.30
All Acc	8.280	16.24	21	n.s.
Intervention	8.30	36.95	23	.04

Models

Baseline: (39 months) $(1-B^{12})Y_t = -.98 + (1 + .22^*B^3)(1 - .37^*B^8)(1 - .85B^{12})a_t$

All Accidents: $(1-B^{12})Y_t = -2.62 + (1 + .27^*B^3)(1 - .35B^8)(1 - .91B^{12})a_t$

Intervention: $(1B^{12})Y_t = -8.53X_t + (1 - .37B^8)(1 - .92B^{12})a_t$

*parameter not significant

Columbus Pedestrian Accidents:
All Involving Adults (Ages 15+).

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	32	31	41	34	31	27	26	22	26	37	29	37	31.08
1974	28	27	23	21	22	18	28	13	31	24	26	37	24.83
1975	35	26	35	22	30	29	12	15	20	32	21	29	25.50
1976	28	28	28	21	17	28	16	16	17	31	26	25	23.42
1977	13	18	15	22	24	22	20	21	22	36	32	25	22.50
1978	21	23	24	21	24	23	17	24	21	22	19	32	22.58
Avg.	26.17	25.50	27.67	23.50	24.67	24.50	19.83	18.50	22.83	30.33	25.50	30.83	24.99

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	124.51	5	4.729	.001
Month	80.56	11	3.059	.003
Yr x Mon	26.33	55		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	6.454	30.21	25	.20
$(1-B^{12})$	7.583	30.24	25	.20
Base	4.704	31.31	21	.10
All Acc	5.113	20.66	23	n.s.
Intervention	4.977	17.19	23	n.s.

Models

Baseline: (51 months) $(1-B^{12})Y_t = -3.01 + (1 + .35B^2)(1 - .94B^2)(1 - .94B^7)(1 - .90B^{12})a_t$

All Accidents: $Y_t - 24.17 = (1 + .95B^{12})a_t$

Intervention: $Y_t - 24.17 = 3.77X_t + (1 + .95B^{12})a_t$

Milwaukee Pedestrian Accidents:
Darts and Dashes to Children Ages 3-8.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1974	4	1	12	15	22	17	18	16	12	19	4	6	12.17
1975	4	1	13	15	27	19	16	14	9	20	10	4	12.67
1976	6	8	12	15	22	23	16	13	10	16	4	1	12.17
1977	4	2	9	12	17	15	6	13	6	5	4	3	8.00
1978	4	4	5	15	21	19	12	15	15	11	6	7	11.17
Avg.	4.40	3.20	10.20	14.40	21.80	18.60	13.60	14.20	10.40	14.20	5.60	4.20	11.23

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	42.77	4	5.362	.002
Month	178.79	11	22.417	.000
Yr x Mon	7.98	44		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	6.495	213.74	24	.000
$(1-B^{12})$	4.300	103.07	24	.000
Base	2.483	23.68	24	n.s.
All Acc	3.068	23.96	22	n.s.
Int: X unusual	2.94	17.68	24	n.s.

Models

Baseline: (38 months) $(1-B^{12})Y_t = (1 - .87B^{12})a_t$

All Accidents: $(1 - .36B^3 - .31B^5)(1-B^{12})Y_t = (1 - .89B^{12})a_t$

Intervention: $[X_t = 38(0), 12(1), 10(0)]$ $Y_t = -4.22X_{t-1} + \frac{(1 - .89B^{12})a_t}{(1-B^{12})}$

Milwaukee Pedestrian Accidents: All Involving Children
Ages 0-14 Excluding Darts and Dashes to Children Ages 3-8.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1974	16	17	18	25	34	23	27	28	15	21	20	18	21.83
1975	14	20	18	26	38	30	18	19	24	25	25	17	22.83
1976	19	12	25	24	26	37	24	20	26	22	13	30	23.17
1977	16	19	15	29	27	28	20	16	20	26	11	25	21.00
1978	7	21	19	19	31	28	23	19	19	16	17	20	19.92
Avg.	14.40	17.80	19.00	24.60	31.20	29.20	22.40	20.40	20.80	22.00	17.20	22.00	21.75

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	21.33	4	1.085	.376
Month	115.50	11	5.872	.000
Yr x Mon	19.67	44		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	6.136	79.72	30	.000
$(1-B^{12})$	6.233	46.31	30	.05
Base	4.258	31.70	22	.09
All Acc	4.393	34.95	22	.05
Intervention	3.743	17.14	23	n.s.

Models

Baseline: $(1-B^{12})Y_t = .69 + (1 - .91B)(1 - .84B^{12})a_t$
(38 months)

All Accidents: $(1-B^{12})Y_t = -.59 + (1 - .40B)(1 - .91B^{12})a_t$

Intervention: $(1-B^{12})Y_t = .126X_{t-2} + (1 - .66B)(1 - .90B^{12})a_t$
(X_t = Willy TV)

Milwaukee Pedestrian Accidents:
All Involving Children Ages 0-14.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1974	20	18	30	40	56	40	45	44	27	40	24	24	34.00
1975	18	21	31	41	65	49	34	33	33	45	35	21	35.50
1976	25	20	37	39	48	60	40	33	36	38	17	31	35.33
1977	20	21	24	41	44	43	26	29	26	31	15	28	29.00
1978	11	25	24	34	52	47	35	34	34	27	23	27	31.08
Avg.	18.80	21.00	29.20	39.00	53.00	47.80	36.00	34.60	31.20	36.20	22.80	26.20	32.98

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	97.10	4	3.276	.019
Month	541.11	11	18.253	.000
Yr x Mon	29.64	44		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	11.383	177.47	24	.000
$(1-B^{12})$	7.933	31.58	24	.20
Base	6.44	32.81	23	.09
All Acc	6.048	38.22	23	.03
Int: W off/on	5.319	24.52	24	>.30
Int: W-TV	5.125	19.67	24	n.s.

Models

Baseline: $(1-B^{12})Y_t = .53^* + (1 - .85B^{12})a_t$
(38 months)

All Accidents: $(1-B^{12})Y_t = -1.211 + (1 - .91B^{12})a_t$

Intervention: $(1-B^{12})Y_t = -2.69X_t + (1 - .93B^{12})a_t$
(X_t - Willy off/on)

Intervention: $(1-B^{12})Y_t = -.24X_t + (1 - .93B^{12})a_t$
(X_t = Willy TV)

*parameter not significant

Milwaukee Pedestrian Accidents:
All Involving Adults (Ages 15+).

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	39	52	46	41	23	39	30	29	35	53	36	65	40.67
1974	44	29	38	33	34	37	33	22	31	42	54	60	38.08
1975	39	37	33	27	26	31	37	33	42	38	33	52	35.67
1976	40	47	34	39	34	34	32	34	29	32	30	42	35.58
1977	41	51	25	33	27	42	42	32	42	40	42	44	38.42
1978	42	42	42	27	39	32	31	28	37	35	46	53	37.83
1979	53	40	50	32	51	45	37	32	49	39	37	48	42.75
Avg.	42.57	42.57	38.28	33.14	33.43	37.14	34.57	30.00	37.86	39.86	39.71	52.00	38.43

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	79.76	6	1.767	.119
Month	231.04	11	5.120	.000
Yr x Mon	45.129	66		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	8.501	63.88	25	.000
$(1-B^{12})$	8.826	36.29	25	.08
Base	7.319	23.81	24	n.s.
All Acc	7.610	38.16	24	.04

Models

Baseline: (50 months) $(1-B^{12})Y_t = (1 - .91B^{12})a_t$

All Accidents: $(1-B^{12})Y_t = (1 - .88B^{12})a_t$

Other Wisconsin Urban Pedestrian Accidents:
All Involving Children Ages 5-9.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	3	5	8	6	8	3	8	3	7	5	4	7	5.58
1974	4	3	2	5	3	7	5	3	1	8	6	6	4.42
1975	1	6	7	5	5	3	5	5	7	3	6	5	4.83
1976	2	6	11	8	7	4	5	6	4	5	3	5	5.50
1977	7	1	8	6	4	5	2	6	5	7	4	7	5.17
1978	8	8	5	7	9	7	5	5	4	7	3	3	5.92
1979	7	7	8	5	5	4	7	3	3	5	4	4	5.17
Avg.	4.57	5.14	7.00	6.00	5.86	4.71	5.28	4.43	4.43	5.71	4.28	5.28	5.23

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	2.99	6	.742	.619
Month	4.61	11	1.144	.343
Yr x Mon	4.03	66		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	2.008	23.06	25	n.s.
$(1-B^{12})$	2.879	34.70	25	>.10

(Series does not show sequential dependencies, so analysis is properly based on anova techniques.)

Other Wisconsin Urban Pedestrian Accidents:
All Involving Children Ages 0-4, 10-14.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	10	5	6	5	6	6	6	8	5	2	5	10	6.17
1974	6	4	3	3	12	7	6	8	7	7	4	4	5.92
1975	4	5	5	5	10	8	2	8	8	8	8	3	6.17
1976	8	7	7	3	10	3	6	3	6	5	2	8	5.67
1977	6	6	5	4	1	3	5	3	4	2	6	4	4.08
1978	1	0	3	5	9	8	4	6	7	5	4	7	4.92
1979	13	3	7	3	7	7	6	5	5	3	4	6	5.75
Avg.	6.86	4.28	5.14	4.00	7.86	6.00	5.00	5.86	6.00	4.57	4.71	6.00	5.52

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	6.99	6	1.275	.280
Month	8.81	11	1.607	.117
Yr x Mon	5.48	66		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	2.457	16.37	25	n.s.
$(1-B^{12})$	3.518	29.70	25	.25

(Series does not show sequential dependencies, so analysis is properly based on anova techniques.)

Other Wisconsin Urban Pedestrian Accidents:
All Involving Adults (Ages 15+).

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1973	24	15	19	16	10	15	22	12	19	30	15	33	19.17
1974	22	10	25	8	11	13	7	19	10	19	22	25	15.92
1975	21	20	14	21	17	20	16	25	19	28	33	21	21.25
1976	38	18	16	28	21	13	17	21	13	26	13	25	20.75
1977	26	22	17	25	20	20	16	19	18	17	26	32	21.50
1978	31	18	19	13	27	13	29	26	28	34	28	30	24.67
1979	40	24	28	26	17	23	35	25	35	36	27	23	28.25
Avg.	28.86	18.14	19.71	19.57	17.57	16.71	20.28	21.00	20.28	27.14	23.43	27.00	21.64

Analysis of Variance

Source	Mean Square	d.f.	F	p
Year	185.38	6	6.042	.000
Month	114.17	11	3.721	.001
Yr x Mon	30.68	66		

Time Series Analysis

Model	SE residual	Q	d.f.	p
None	7.275	68.07	25	.000
$(1-B^{12})$	7.946	72.71	25	.000
Base	5.25	29.02	22	.20
All Acc	6.035	26.12	21	.20
Intervention	5.906	34.81	21	.04

Models

Baseline: (50 months) $(1-B^{12})Y_t = (1 - .20^*B)(1 + .79B^3)(1 - .79B^{12})a_t$

All Accidents: $Y_t - 21.89 = (1 + .41B^2 + .25B^3)(1 + .41B^{12})a_t$

Intervention: (X_t = Willy off/on) $Y_t - 21.53 = \frac{2.50^*X_t}{(1-.68B^{12})} + (1 + .39B^2 + .11^*B^3)(1 + .53B^{12})a_t$

*parameter not significant