December 1981
Final Report

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National Highway Traffic Safety Administration

Experimental Field Test of Proposed Anti-Dart-Out Training Programs

Volume 1
Conduct and Results

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16. Abstract This report describes the conduct and results of an evaluation of a child pedestrian anti-dart-out training program. Two versions were tested: A film program and a film/simulator program.

Before/after accident and street crossing behavior data were collected in one city for each program, and in a comparison city. Accident data were collected in two additional comparison cities. Data on student/teacher reactions and deviations in the conduct of the program were also collected.

The film program was found to be superior in reduction of unsafe street-crossing behavior and on various practicality considerations. Although traditional levels of statistical significance were not obtained in the main analyses, there is statistical and intuitive evidence to support the effectiveness of the film program in the reduction of accidents among the children exposed to the program. Teacher attitudes toward the film/simulator program are initially superior, although this difference lessens over time. Student attitudes are generally positive. Deviations are numerous but serious in only a few cases concerning the film/simulator program.

The film program is recommended for further development/implementation. Discussions of results and program improvements are provided.

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METRIC CONVERSION FACTORS

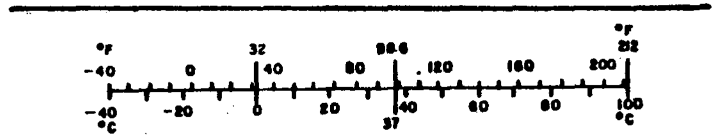
Approximate Conversions to Metric Measures

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, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

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



ADDENDUM

This study focused on the question of whether either or both of two experimental training programs were effective in reducing "dart-out" type pedestrian accidents occurring to young children. As can be the case with research done in the field, there were constraints operating on the study which need to be taken into account when considering the utility and meaning of various measures of program effectiveness. It was not possible, for example, to select the test cities randomly because candidate cities had to be selected from a prescribed group for whom accident data of a special nature (i.e., classified into accident types) were already being collected. This constraint, along with others involving non-random assignment of experimental units (schools and classes) to treatment conditions, has the net effect of allowing less reliance to be placed on the statistical findings and requiring more emphasis to be put upon the consistency of the findings across the variety of measures taken. The latter present a consistent, positive pattern. A substantial accident reduction (20%) remains even after taking into account related changes in a set of comparison cities. Within the test city, schools participating in the training showed a decrease in dart-out accidents while non-participating schools showed an increase. With respect to behavioral effects, unsafe street-crossings were reduced. And finally, the acceptance of the users and the absence of any negative effects lend strong support to the decision that one of the programs, the Film Program, be implemented as an effective countermeasure for the dart-out accident occurring to grade-schoolers. Going beyond this particular study, it can be noted that variations of the Film Program (but containing the same behavioral advice) are being used in two other locales (Denver and Miami) and that preliminary indications are that they are also achieving substantial reductions in dart-out accidents.

DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

TECHNICAL SUMMARY

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REPORT TITLE	Experimental Field Test of Proposed Anti-Dart-Out Training Programs. Volume 1. Conduct and Results	REPORT DATE December 1981
REPORT AUTHOR(S)	Dueker, Richard L.	

Objective

To perform a field test to evaluate two alternate versions of an anti-dart-out training program to prevent child pedestrian accidents. Based on the findings, the preferred program alternate was to be selected, and the materials for the selected program were to be revised.

- Volume 1 contains the conduct and results of the evaluation.
- Volume 2 is designed as a user's manual, and includes revised text and specifications for all program materials.
- Volume 3 contains materials for training the program coordinator and instructors, as well as a script for an introductory videotape.

Background Information and Methodology

Volume 1 describes the conduct and results of an evaluation of two alternate child pedestrian safety training programs. Both programs are designed to prevent dart-out type accidents in the 5-9 year old age group. One version, the film program, was initiated in the Toledo Public Schools in February 1975 and was completed in May 1976. An 8-9 session initial training period (including a safety film, inside practice sessions using ride-in, pusharound model cars, and outside on-street practice sessions) was completed in the spring of 1975. A three-session refresher training period was conducted the following fall. Follow-on practice sessions were conducted periodically throughout the operational period.

The second version, the film/simulator program, differs from the film program in that a traffic-flow simulator replaces the pusharound cars for the inside practice sessions. The simulator provides synchronized rear-projected color sound films of left and right approaching traffic on 6 x 8 foot screens. This program was initiated in the New Orleans Public Schools

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July 1974

in September 1975, and was completed in March 1977. Initial training took place during the 1975-76 school year, with refresher training the following fall and winter.

Data on street-crossing behavior, teacher and student user reaction to the program, and deviations in the conduct of the programs were collected in both cities. Before, operational, and post-operational period child pedestrian accident data were also collected. For comparison purposes, accident and street-crossing behavior data were collected in the city of Akron, Ohio; and accident data only in Columbus, Ohio and San Diego, California.

Results

The findings are as follows:

1. Although traditional levels of statistical significance were not obtained in the main analyses, there is statistical and intuitive evidence to support the effectiveness of the film program in the reduction of accidents among the children exposed to the program.

2. The film program initial training results in greater reduction in unsafe street-crossing behavior than the film/simulator program, although both are significantly better when compared to the comparison group. For both programs, the reduction in unsafe street crossings is maintained over the operational period.

3. Teachers' attitudes toward the film/simulator program were initially more positive than those toward the film program. Attitudes toward the film program improved significantly over time, eliminating any differences.

4. Children generally liked both programs with no differences over time. Children in the film/simulator program preferred inside (simulator) sessions over outside sessions during initial training. The opposite was true for the film program. The film/simulator children showed least preference for the inside session after refresher training, implying that the simulator may have lost its special appeal.

5. The major deviation of importance for the film program was failure to administer follow-on sessions. In the film/simulator program, many schools also deviated substantially in the conduct of initial training and failed to conduct refresher training. In addition, important deviations in the overall administration of the film/simulator program were found. Many minor deviations were reported.

The film program is recommended for further testing and eventual promulgation as a child pedestrian accident countermeasure. Recommendations are provided for modifications to the film program. General insights relevant to future National Highway Traffic Safety Administration (NHTSA) pedestrian accident countermeasures development are discussed.

Potential Applications

The anti-dart-out training program evaluated in this study can be employed by local communities as a countermeasure against Dart-Out First Half pedestrian accidents and, potentially, other similar dart-out type accidents that heavily victimize the 5-9 age group.

Volume 2 provides detailed descriptions of all training materials employed with the recommended version of a child pedestrian safety program. The materials have been revised in accordance with the recommendations provided in Volume 1.

Volume 2 is designed to serve as a user's guide for school systems implementing the program. It provides complete, organized information on every aspect of the program. Implementation guidelines are provided and issues of concern to users are discussed. The full texts of the program guides which specify program content and conduct are provided. Copies of all printed materials are included. Specifications for the other program materials are provided and possible alternatives are discussed.

Several recommended additional materials (a Coordinator's Training Curriculum, an Instructor's Training Curriculum, and an introductory videotape script) have been produced in draft form for use in the program and are included in Volume 3.

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SECTION 1

INTRODUCTION

The National Highway Traffic Safety Administration (NHTSA) within the U.S. Department of Transportation is responsible for providing the states with the means to reduce the number of fatalities and injuries resulting from pedestrian-vehicle collisions, as well as those from vehicle-vehicle crashes. As part of this responsibility, NHTSA has been engaged in an active program of research to identify the causes of pedestrian accidents and to develop and test accident countermeasures. This report describes the conduct and results of one effort within this research and development program.

Background

Initial NHTSA research,[1] later confirmed in a second study,[2] identified and described over 30 pedestrian accident types in terms of:

1. The situational factors which predisposed or "set the stage" for the occurrence of the accident.

2. The behavioral errors or failures which actively precipitated the accident.

3. The target group factors, i.e., human characteristics and/or physical locations typically associated with the accident.

Nearly all of the pedestrian accident types were judged to be preventable through the application of appropriate countermeasures. The countermeasures could be grouped into several general types: Modification to the

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[1] Snyder, M. B. & Knoblauch, R. Pedestrian safety. The identification of precipitating factors and possible countermeaures. Volumes I and II. Springfield, VA: National Technical Information Service, U.S. Department of Commerce, January 1971. (Volume I--DOT HS-800 403; Volume II--DOT HS-800 404)

[2] Knoblauch, R. L. Urban pedestrian accident countermeasures experimental evaluation. Final report. Volume II: Accident studies. Washington, DC: National Highway Traffic Safety Administration and Federal Highway Administration, February 1975. (DOT HS-801 347)

settings, public information directed to drivers and pedestrians, driver and pedestrian training, passage of new traffic ordinances, and improved traffic enforcement.

The two research projects documented several important findings:

1. Of the pedestrian accident victims, 50 percent were 14 years old or younger.

2. More dramatically, 30 percent of the accidents happened to children in the 5-9 year old group.[3] This group was, by far, the most heavily victimized age group (the 0-4 and 10-14 groups were next with about 10 percent each).

3. About one-fourth (24 percent) of the accidents to this heavily victimized 5-9 year old group were attributed to a single accident type, called the Dart-Out First Half.[4]

4. Fully two-thirds (66 percent) of the accidents to this group involved five similar midblock dart-out and dash accident types, including Dart-Out First Half.[5]

The Dart-Out First Half accident type occurs midblock when the child suddenly appears in the path of the vehicle and is hit in the first half of the roadway. The driver either does not see the child or does not have time to react to avoid the collision. Often the child is entering from between parked cars or is running, but these are not necessary conditions, except as they predispose the sudden appearance of the child. These accidents tend to occur on residential streets near the child's home. In about half of the cases, the child is intent on play (23 percent) or friends/family (29 percent); he/she does not search for nor detect the presence of the threatening vehicle.

The remaining four dart-out and dash accident types may be briefly defined as follows:

1. Dart-Out Second Half. This type is the same as a Dart-Out First Half, except that the victim is struck in the second half of the roadway, i.e., after crossing more than half of the road.

2. Midblock Dash. The Midblock Dash involves running as a critical causal factor in the accident. This classification is employed where the accident investigation

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[3]Snyder & Knoblauch, Volume II, p. E-3.

[4]Ibid, p. E-19.

[5]Knoblauch, p. 3-14.

does not specify that sudden appearance (required for the dart-out types) was a critical factor. The dart-outs and midblock dash are otherwise quite similar.

3. Pedestrian Strikes Vehicle. This type is basically a dart-out or dash in which the pedestrian walks/runs into the front or side of a vehicle.

4. Vendor-Ice Cream Truck. Again, this is a dart-out or dash which occurs as the child crosses to or from a vendor, usually an ice cream truck.

Given the initial research findings, it was clear that an important part of NHTSA's pedestrian accident countermeasure research and development effort should be directed to the 5-9 year olds. To be effective, the countermeasures developed for this group would have to impact the dart-outs and dashes, especially Dart-Out First Half.

Training is one of two countermeasure alternatives which showed the greatest promise of impacting the target audience.[6] The 5-9 year old group is normally enrolled in Kindergarten through third-grade. Thus, the group can be reached through the educational system which is already qualified to provide the training required. The child could be trained to engage in safe street-crossing practices and to avoid the search and detection errors which lead to child pedestrian accidents.

This logic led NHTSA to initiate, in the summer of 1973, a project to develop and pilot test an anti-dart-out training program. The training development project:

1. Specified a "safe street-crossing behavior sequence," i.e., a set of behaviors which, if followed, would permit the child to safely cross streets midblock and specifically avoid the accident precipitating search and detect errors. The sequence was to be the heart of the training.

2. Identified alternate training techniques and appropriate approaches for use within typical school systems for the 5-9 year old group.

3. Defined the general characteristics of the training necessary to ensure:

    a. Learning of the sequence by even the youngest of the group.

    b. Permanency of the learning.

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[6] Public Information is the other approach.

c. Transfer of learning to the actual play situations which predispose the dart-out accidents.

As the result of these efforts, three variants of the basic training approach were developed and pilot tested, each in a separate elementary school. Based on the results of the pilot testing, which evaluated changes in unsafe street-crossing behavior following training, two of the three alternates were recommended for field testing.[7]

Project Activities

The present project was initiated in the summer of 1974 as a direct follow-on to the training program development effort. The project had as its objectives the administration of two anti-dart-out training program alternates and subsequent evaluation of these programs in terms of reduction in accident frequency, reduction in unsafe street-crossing behaviors, administrative feasibility, and program acceptability. The project was carried out in two phases:

1. Phase I. The purposes of Phase I were to:

    a. Develop a detailed plan for the evaluation of the training programs.

    b. Obtain cooperation from the public school systems in two cities in which the programs would be implemented, and a single city in which street-crossing behavior comparison data would be collected.

    c. Produce all required program materials in numbers sufficient for the evaluation.

    d. Make preparations for the initiation of the evaluation.

2. Phase II. In Phase II, the major purposes were to:

    a. Initiate and carry through on a continuing basis the two training programs, each in its respective city.

[7] The conduct and results of this project are presented in: Dueker, R. L. Threat detection training programs for child pedestrian safety. Volume 1: Conduct, results and recommendations. Volume 2: Program training materials. Final report. Washington, DC: Department of Transportation, National Highway Traffic Safety Administration, June 1974. (Prepared under Contract DOT-HS-339-3-726) (DOT HS-801 450)

b. Collect data permitting a comparison of the two programs with regard to:

(1) Ability to reduce the frequency of Dart-Out First Half and other specified accident types.

(2) Ability to create and maintain improved street-crossing behaviors.

(3) Teacher and student reaction to and acceptance of the program.

(4) Deviations in the administration of the program and conduct of the various program activities.

c. Analyze and interpret the data and recommmend one program for large-scale use.

d. Provide final modifications to the training materials for the selected program.

Report Overview

This document is Volume I of a three-volume report. The following section provides a general review of the conduct of field testing activities and a brief description of the two program alternates tested. Following this are three sections devoted to the presentation of the four major areas of analysis performed as part of the program evaluation. For each area, conduct of the data collection is described and the results are documented. The last major section in the body of the report provides a summary of the results and the recommendation in favor of one of the two program alternatives. Also, this section reviews recommended modifications to the selected alternate, and provides general insights related to future NHTSA countermeasure research and development efforts.

Volume 2 of this report contains text or specifications, revised in accordance with Volume 1 recommendations, for each program material required for conduct of the selected training program alternate. The volume also discusses certain issues important to school systems interested in implementing the program.

Volume 3 provides lesson plans and materials for brief courses to train the program coordinator and the program instructors. This volume also contains the script for a videotape which introduces and overviews the safe street crossing program.

SECTION 2

GENERAL OVERVIEW OF FIELD TESTING

In this section, the two anti-dart-out training programs evaluated in the field test are described. Also, the conduct of the project is overviewed. Detailed descriptions of the data collection associated with each of the individual evaluation emphases--accident reduction, reduction in unsafe street-crossing behaviors, administrative and program deviations, and user acceptability--are provided in subsequent sections.

Description of the Programs

The two training alternatives are referred to as the film program and the film/simulator program. The film program was first defined in the development and pilot test project and its name is intended to distinguish this alternate from another alternate which did not include the use of the pedestrian safety film "Don't Dart-Out" (to be described below). The second training program alternate selected as a result of the pilot testing involved use of a traffic flow simulator. It was decided at the outset of field testing to also include the film as part of the simulator program and so this program alternate was named the film/simulator program.

General Features of Both Programs

Both the film and film/simulator programs involve three major training aspects as described in the paragraphs to follow. Although the descriptions are couched in terms of how the programs were designed to be administered in schools in general, they also accurately reflect how the programs should have been administered during field testing. Deviations from this ideal are an important program evaluation concern as discussed in Section 5.

Initial Training. Initial training is given to all Kindergarten through third-grade children during the first year of program implementation in the school system. In subsequent years, it is given only to Kindergarteners and children who have not previously had the program. This training is the child's first exposure to the program, and it is designed to provide complete systematic reinforced practice.

The safe street-crossing behavior sequence is defined as follows:

1. Stop at the curb (if no parked cars are present), or at the boundary between the parking lane and traffic lane close enough to touch the parked car (if parked cars are present).

2. Look left, so that the field of vision can include all of the left approaching traffic lane. If no cars are coming,

3. Look right, so that all of the traffic lanes can be seen. If no cars are coming,

4. Look left again to be sure the road is still clear.

5. If a car is approaching, stop searching and track the car (i.e., follow the car with your eyes) until it has passed completely, then reinitiate the search (i.e., start the left-right-left search over again).

6. Continue this procedure until the left-right-left sequence can be completed without detecting approaching traffic, then cross.

The initial training consists of eight 30-45 minute sessions (plus one optional make-up session) distributed over 3-4 weeks. Five of the eight sessions are performed indoors and three outdoors. The program and the sequence are introduced using a 15-minute sound color motion picture entitled "Don't Dart-Out." The film features a child-prestigious personality (CBS Television's Captain Kangaroo) who teaches three children to safely cross streets. The teacher further demonstrates the sequence and the children practice the sequence inside on a simulated "street" using practice games. The sequence is then practiced by playing the three practice games outside on real (blocked) streets. The games are designed to duplicate the typical motivations for dart-out behavior (i.e., retrieving a ball, being called by someone, and being chased). All practice, both using the simulated or real streets, is done midblock.

Refresher Training. At the beginning of each subsequent school year through grade three, the children who previously had initial training are to receive refresher training. This training is designed to re-establish the sequence which may have extinguished over the summer vacation. Refresher training involves one inside and two outside sessions repeated from initial training.

Follow-on Activities. After both initial and refresher training, follow-on activities are to be conducted monthly throughout the remainder of the school year. These activities are intended to provide additional spaced practice of the sequence to improve the permanency of the learning. The activities can include repeated favorite games from initial training, practice during other school activities (e.g., fire drills, walks), or teacher-invented activities.

Distinguishing Features of the Programs

The film and film/simulator programs differ in the approach used to provide indoor practice of the sequence. The film program simulates traffic through the use of "pusharound" cars. These are fiberboard car mock-ups on castors. The children stand inside the cars and push them around the simulated street. The street is laid out using masking tape, and the children push the cars (three cars are provided to each school) in each direction on the street to provide left and right approaching traffic. For some sessions, a pusharound car is used to simulate a parked vehicle.

The pusharound cars are hinged to fold flat for storage.

The film/simulator program uses a traffic flow simulator instead of pusharound cars to facilitate indoor practice. The simulator uses two rear projection systems to project synchronized color films of moving traffic with stereophonic traffic noises. Each rear projection system consists of a super 8mm, continuous film loop projector, and a 6 x 8 foot rear projection screen. A synchronizing circuit mounted in a central control box allows the motor speed of one projector to be adjusted to achieve matched projector speeds. The control circuit also permits the projectors to be turned on and off simultaneously. A diagram of the traffic flow simulator is provided in Figure 2-1.

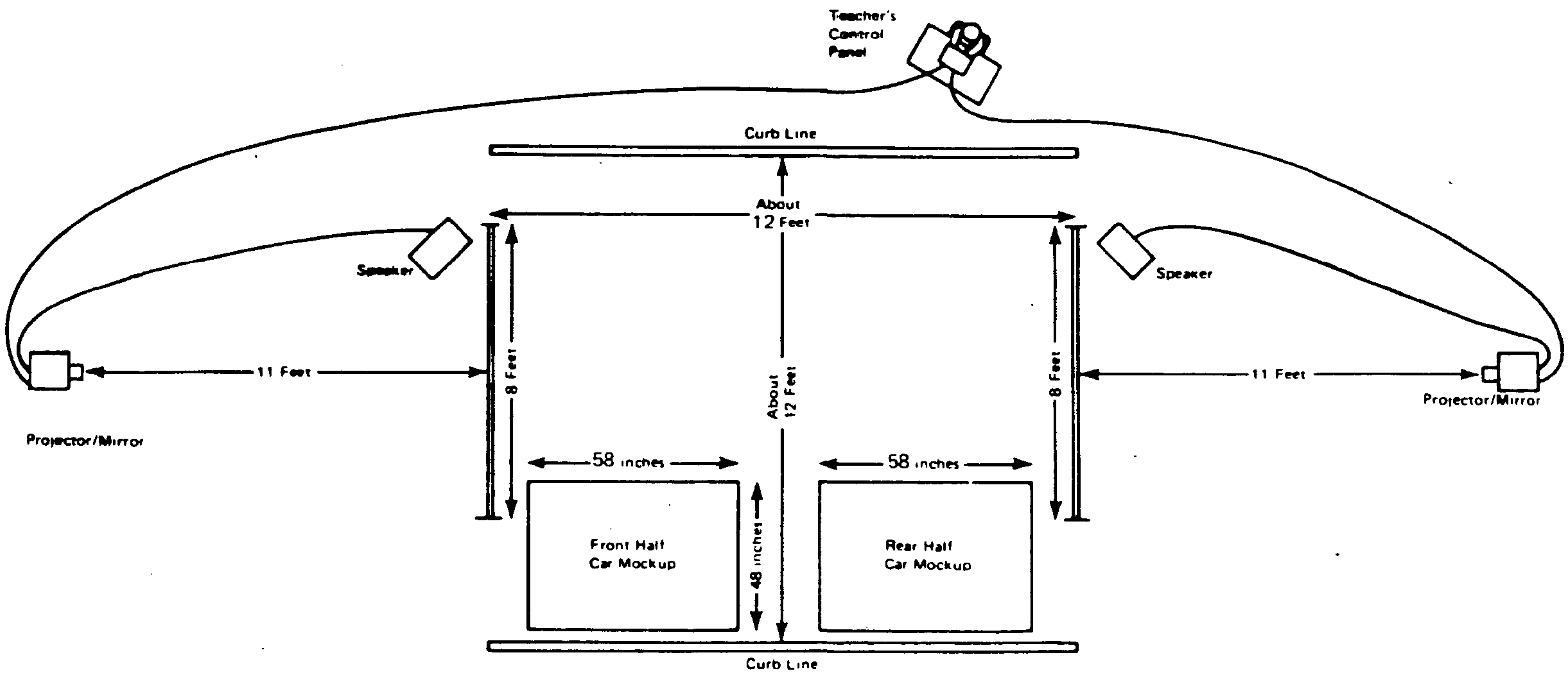
In operation, the screens are set up in parallel about 10 feet apart. A masking tape curb is stretched between the screens. The child crosses between the screens during appropriate breaks in the project traffic flow. For some sessions, a large fiberboard three-dimensional car mock-up is employed to simulate a parked vehicle.

Conduct of the Field Testing

The design of the field testing called for both program alternates to be implemented for three semesters each in a separate public school system. Child pedestrian accident and street-crossing behavior data were to be collected in a comparison city.

Preparation activities (e.g., cities' selection, finalization of the work plan, and training materials production) were to continue through the second half of calendar 1974, with program initiation to occur early in 1975, i.e., the winter semester of the 1974-75 school year. Unfortunately, the school system which agreed to conduct the film/simulator program rescinded their support in January 1975. It was decided to initiate the film program on schedule, and efforts to recruit a new film/simulator city were undertaken. The replacement city initiated the film/simulator program the following September, seven months later than the start of the film program.

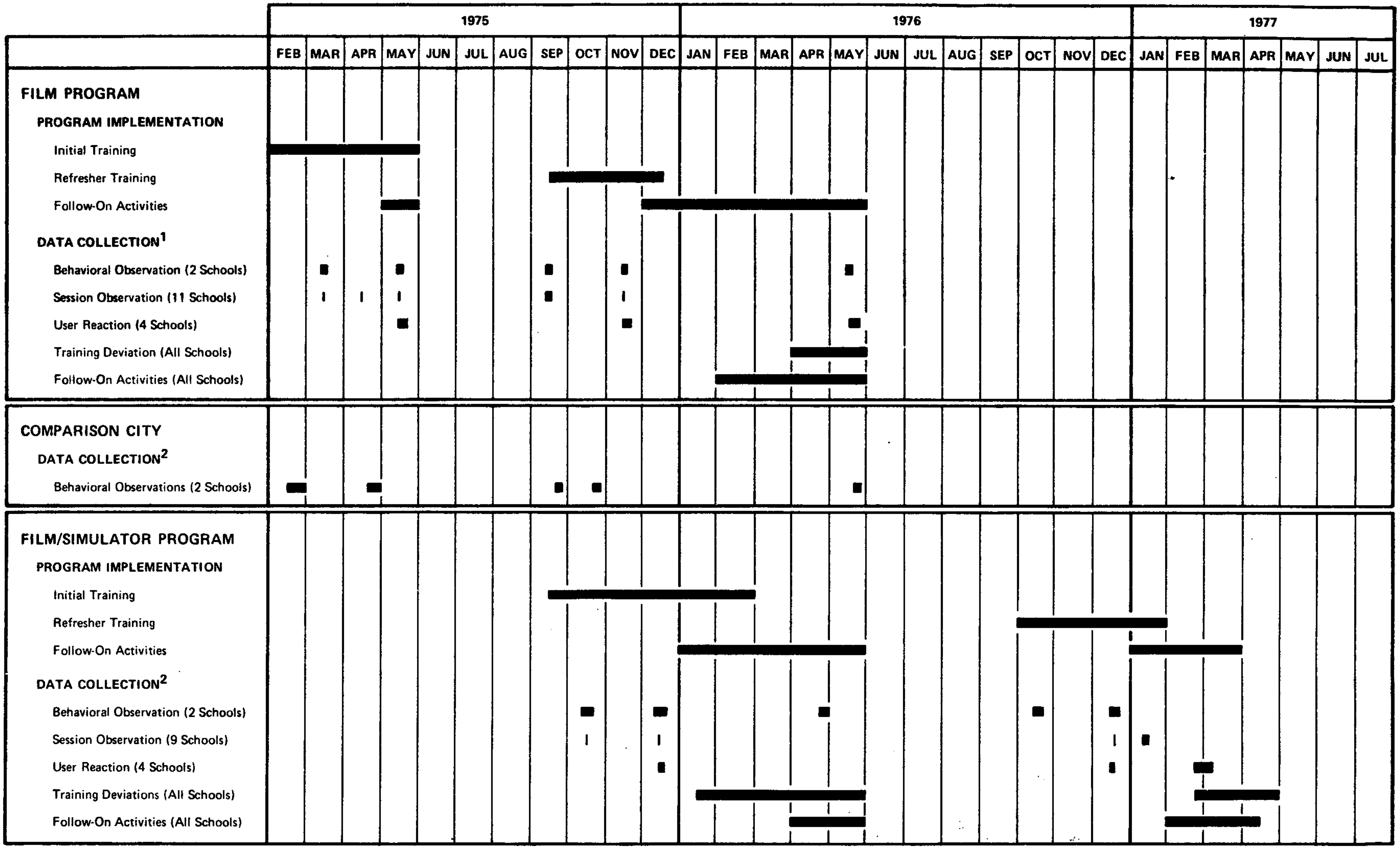
The film program was administered in the Toledo, Ohio, public school system; the film/simulator program in the New Orleans, Louisiana, public schools. The comparison city was Akron, Ohio, and behavioral data was collected in their public school system. Pedestrian accident data, classified according to the NHTSA types were collected in these three cities. In addition, such data were available from Columbus, Ohio; and San Diego, California. Accident data from Akron, Columbus, and San Diego provided the baseline against which accident reduction in the program cities were evaluated.



Note: In Sessions where car mock-ups are not employed, the curb line is placed closer to the screen.

Figure 2-1. Diagram of Traffic Flow Simulator

Figure 2-2 summarizes the major program implementation and data collection activities conducted throughout the field testing. As noted in the figure, the film program operational period ended in May 1976; the film/simulator program operational period was intended to end in December 1976, although follow-on activities were reported in some schools through March 1977. In both cities, several months of accident data were collected after program activities were suspended. This period is termed the post-operational period. Together, the operational and post-operational periods make up the 23-month after period employed in the accident analyses.



[1] Accident data for the film program city were collected and verified throughout the period and included data from January 1973 – December 1976.

[2] Accident data for the comparison cities and the film/simulator program were collected and verified throughout the period and included data from January 1973 – July 1977.

Figure 2-2. Overview of Program Implementation and Data Collection Activities

SECTION 3

ACCIDENT REDUCTION

An important element in the field testing was to determine whether conduct of the training programs resulted in noticeable reduction in pedestrian accidents in the target group. More specifically, the objectives were to determine:

1. Whether the before to after period reduction (if any) in the program city was significantly greater than any parallel change in three comparison cities--Akron, Ohio; Columbus, Ohio; and San Diego, California.

2. Which program alternative resulted in the greater reduction.

Of primary concern in the accident analyses was the reduction of Dart-Out First Half accidents, since the training programs were designed to have the greatest impact on this accident type. It was also important, however, to judge the effect of the programs on other dart-outs[8] as well as all other (i.e., non-dart-out) accidents.

Data Collection

In order to properly evaluate the potential effect of the programs on accident reduction, it was necessary to identify those pedestrian accidents involving 5-9 year old children who were enrolled in participating schools. For the comparison cities, where no program was conducted, "participating schools" were defined to include the entire public school system. These accidents were identified for both the before period and the after period. The after period was defined as that period beginning at the onset of program administration.

The process of compiling accident data in each of the three cities involved three steps:

1. Collect/Classify Accident Reports. In four of the cities, child pedestrian accident reports with accident types already assigned were available from the Urban

[8] Including Dart-Out Second Half, Midblock Dash, Pedestrian Strikes Vehicle and Vendor-Ice Cream Truck accident types.

Pedestrian Accident Data Base currently being maintained by NHTSA and FHWA.[9] Child pedestrian accident cases for the film/simulator program city were obtained from another NHTSA contractor currently collecting accident data in that city, and accident types were assigned by project staff.

2. Collect Supplemental Accident Data From School System Records. In the film program city, where data base accident files were known to be incomplete, supplemental accident data were compiled from the essentially complete files maintained by the school system. The two data sources were compared and police accident reports were obtained for the additional accidents identified. Accident types were assigned to the additional cases by project staff.

3. Identify Cases Involving Participating Schools. For the program cities, listings of accident victim names and accident dates were supplied to the school systems' records divisions. The lists were compared with school enrollment rosters for the appropriate period to identify which school each victim attended at the time of his/her accident or whether, in fact, the victim was enrolled in any of the public elementary schools.

Because the school systems in the five cities differed in size and because enrollment can be expected to change in a school system over time, it was decided that accident rates rather than accident frequencies would be employed for at least the major analyses. The school systems provided enrollment data separately by school. The rate was derived by dividing the number of accidents in a given month by the first through third grade enrollment of the schools and multiplying by an arbitrary baseline of 10,000.

Before/After Period Comparisons

Several factors influenced the final selection of the approach used to summarize and analyze the accident data:

1. It was not possible to select matched program and control cities. When cities' selection occurred, only a few cities' pedestrian accident data were classified

[9] A description of this data base is contained in: Knoblauch, R. L. Urban pedestrian accident countermeasures experimental evaluation. Final report. Volume II. Accident studies. Washington, DC: NHTSA and FHWA, 1974. (DOT-HS-801 347)

by accident type. Further, selection of experimental cities was dependent upon obtaining the cooperation of their public school systems. Thus, free choice, even within the small group of useable cities, was constrained.

2. Because the programs could not be implemented at the same time, it was not appropriate to directly compare the program cities to each other and to a control.

3. The accident rates were lower than expected and had high month-to-month variability. Their distributions were poisson rather than normal in form.

These factors, and their effect on the selection of the analyses approach, are discussed in more detail in Appendix A.

Six independent analyses were performed to test the extent to which each program (film or film/simulator) resulted in a reduction on three separate accident type groupings (Dart-Out First Half, All Other Dart-Outs and All Other Pedestrian Accidents). In each analysis, the mean accident rate for the after period in the program city was subtracted from the before period mean rate to obtain a net difference score. A net difference score was also calculated for the comparison cities.[10] The significance of the difference between the program and comparison cities' scores was evaluated, using a one tailed t-test.

A modified square root transformation was performed on the monthly accident rates to normalize the data prior to computing the t-tests.

Table 3-1 summarizes the film and film/simulator program analyses. For the film program, the before period was 25 months long, ending in January 1975; and for the film/simulator program, its duration was 32 months.[11] The after period for both programs was the subsequent 23 months.

Inspection of the table indicates that:

1. None of the comparisons show differences large enough to reach significance, using the customary p=.05 level as

[10]The comparison condition before and after period mean rates were computed from the individual mean rates for the three comparison cities. This approach was preferable, given that comparison cities could not be preselected randomly or matched to the program cities.

[11]Accident data for both programs were compiled beginning in January 1973. Because the film/simulator program was initiated seven months later than the film program, these additional months of data are available for inclusion in the film/simulator program before period.

Table 3-1

Before/After Period Accident Rate Comparisons for Film and Film/Simulator Programs

FILM PROGRAM	Before Period* (25 mos.)	After Period* (23 mos.)	Analyses Results**
Dart-Out First Half			
Program City	1.450	.832	t=1.065; df=92;
Comparison Cities	.731	.564	p=.14
All Other Dart-Outs			
Program City	1.588	1.425	t=.928; df=92;
Comparison Cities	.751	.750	p=.18
All Other Accidents			
Program City	1.525	1.146	t=1.119; df=92;
Comparison Cities	.995	1.054	p=.14

FILM/SIMULATOR PROGRAM	Before Period* (32 mos.)	After Period* (23 mos.)	Analyses Results**
Dart-Out First Half			
Program City	.805	.855	t=.575; df=106;
Comparison Cities	.700	.541	p=.28
All Other Dart-Outs			
Program City	1.355	1.148	t=.200; df=106;
Comparison Cities	.804	.607	p=.42
All Other Accidents			
Program City	1.035	.856	t=.667; df=106;
Comparison Cities	1.022	1.003	p=.26

*Cell values are the mean number of pedestrian accidents per month, per 10,000 K-3 students enrolled in schools participating in the program. For the comparison cities, all public schools were included in the calculation.

**Each analysis compared the program city before/after mean rate difference with the parallel difference for the comparison cities. One-tailed t test results are shown as calculated from transformed data. See Appendix A for analyses details.

the criterion. For all accident type groupings, however, the film programs' values for p were closer to the criterion value than were the film/simulator program values.

2. The film program shows a large before/after reduction (42.6 percent) for Dart-Out First Half accidents, while the film/simulator program shows none (in fact, a slight increase). This reduction is substantial even when compared to a parallel decrease shown by the comparison cities.

3. The other low p value resulted from a modest reduction (24.9 percent) in all other accidents for the film program, combined with a small (5.9 percent) increase for these accidents in comparison cities. Since the other comparison cities before/after differences were all decreases, it is likely that this increase is a sampling anomaly.

Although none of the comparisons was statistically significant using the traditional criteria, two facts must be considered which do differentiate the two program alternates in terms of their relative effectiveness:

1. Statistically, there is less likelihood of an error in accepting the presence of a film program effect on Dart-Out First Half accidents than in accepting the same premise for the film/simulator program.

2. As discussed in the Appendix, the film program post-operational versus before periods comparison does show a significant reduction in accident rates for all (i.e., dart-out plus non-dart-out) accidents ($p=.015$). This may be the result of a delayed onset effect of the program, although the data are insufficient to fully validate this finding. The film/simulator program shows a much more limited reduction.

Given these facts, the weight of evidence is in favor of the film program as the more effective of the two alternates in reducing accidents.

Comparison of Participating and Non-Participating Schools

In each of the program school systems, the individual elementary schools were given the option as to whether or not they would administer the program. In both systems, some schools declined to participate. This group of schools represent a within city control condition and an *ad hoc* analysis was performed comparing the accident experience of the group of schools which offered training against the schools which did not.

The intent of this analysis was to determine whether the distribution of accidents between the two groups of schools in the after period was significantly different from that distribution for the before period. Although the enrollments for both groups in both school systems decreased between periods, the decreases for groups within a school system were roughly the same. Thus, it was possible to use raw frequencies rather than accident rates as the measure. This design and the use of frequency data meant that a statistical analysis could be performed using a nonparametric statistical procedure which would not be subject to the limitations previously discussed.

Tables 3-2 and 3-3 summarize the comparisons of participating and non-participating schools for the film and film/simulator programs, respectively. Each table shows the frequencies of accidents for first- through third-grade children enrolled in participating and nonparticipating schools for both the before and after periods. Separate comparisons are provided for the three accident type groupings, as well as for all accidents. In order to control for possible seasonal variation in the occurrence of accidents, the before and after periods were month matched.[12] For example, the 23-month after period for the film program begins in February 1975, so the before period was defined as the 23 months beginning in February 1971.

Chi-square goodness-of-fit analyses were performed for each comparison testing the null hypothesis that there was no difference between the before and after period distributions.

It is apparent from the tables that:

1. One comparison was significant. The film program Dart-Out First Half accidents for the participating schools were reduced by 47.2 percent, and the difference between the before and after distributions was significant at the .01 level.

2. For all accidents, both groups in both school systems showed accident reduction in the after period. The reduction for the film program participating schools was 32.4 percent, with only 8.0 percent reduction in non-participating schools. Since the reduction in enrollment for the two groups was, respectively, 5.4 and 9.4 percent, the reduction of the participating schools cannot be due to this factor along.

[12] Analyses were performed on the before period data in all three cities to identify the presence of cyclical or deterministic trends in the data. None were found.

Table 3-2

Comparisons of Participating and Nonparticipating Film Program Schools

	Number of Accidents in Schools		
	Participating in the Program (52 schools)	Nonparticipating in the Program (7 schools)	Chi-Square Analysis Results*
Dart-Out First Half			
Before period** (n=45)	36	9	
After period (n=31)	19	12	p<.01
All Other Dart-Outs			
Before period** (n=48)	38	10	
After period (n=36)	32	4	Not significant
All Other Accidents			
Before period** (n=43)	37	6	
After period (n=31)	24	7	Not significant
All Accidents			
Before period** (n=136)	111	25	
After period (n=98)	75	23	Not significant

*Goodness-of-fit chi-square tests were performed computing expected frequencies from the before period accident distribution.

**In this analysis, a 23-month before period was employed, beginning in February 1973, so as to be month-matched to the after period.

Table 3-3

Comparisons of Participating and Nonparticipating Film/Simulator Program Schools

	Number of Accidents in Schools		
	Participating in the Program (42 schools)	Nonparticipating in the Program (43 schools)	Chi-Square Analysis Results*
Dart-Out First Half			
Before period**(n=43)	23	20	
After period (n=40)	20	20	Not significant
All Other Dart-Outs			
Before period**(n=90)	37	53	
After period (n=59)	26	33	Not significant
All Other Accidents			
Before period**(n=58)	28	30	
After period (n=40)	20	20	Not significant
All Accidents			
Before period**(n=191)	88	103	
After period (n=139)	66	73	Not significant

*Goodness-of-fit chi-square tests were performed computing expected frequencies from the before period accident distribution.

**In this analysis, a 23-month before period was employed, beginning in September 1973, so as to be month-matched to the after period.

3. For the film/simulator program, the reduction in all accidents for the two groups was essentially the same, 25.0 percent and 29.1 percent, with the nonparticipating schools showing slightly greater reduction. This compares to an enrollment decrease of 14.2 percent and 11.1 percent, respectively. It would appear that a large part of the reduction in both groups can be explained by the decrease in enrollment.

In interpreting these findings, it is important to remember that the schools were not randomly assigned to groups and, as a result, the outcomes of the comparisons may be biased. In the film program city, for example, the accident rates for the nonparticipating schools were much higher than for the participating schools--6.246 versus 1.489 for the before period Dart-Out First Half accidents. The rate for the nonparticipating group is to be viewed with caution, since it was based on a small sample (i.e., seven schools and a total target group enrollment of 1,670) and will vary greatly due to sample error, depending upon which time period is examined. Nonetheless, it is quite possible that the rate difference is real. It is known that schools in the densely populated urban low income neighborhoods are typically characterized as being overcrowded, understaffed, and as having limited physical facilities. Such schools may be unwilling to implement the program because of these limitations. This, in fact, appears to be the case in the film program school system--six of the seven nonparticipating schools were below the median for the school system in terms of parental income, and the majority of reasons given by school principals for not participating centered around competing time demands. Ironically, this tendency causes schools in those areas where the program is most needed to elect not to implement the program.

If low parental income schools are overrepresented in the film program nonparticipating group, then the higher income schools are overrepresented in the participating group. This bias may imply that the film program effect demonstrated in Table 3-3 can only be generalized to higher income schools. To test the extent to which program effectiveness was a function of the socio-economic level of the school, the 52 participating schools were divided into four quartiles on the basis of the program coordinator judgment, taking into consideration parental income and occupation and neighborhood characteristics. The distribution of all accidents across the quartiles was then compiled for the before and after periods, and the distributions were compared using the chi-square goodness-of-fit approach. This analysis is summarized in Table 3-4.

The table shows that, as expected, the majority of all accidents in both periods occur in schools judged low socio-economic. However, this distribution does not change between periods, indicating that the training did not have a differential effect, depending upon the socio-economic level of the school. Because of the low cell frequencies, the analysis of the Dart-Out First Half data was performed by first combining categories into two--high and low, i.e., above and below the judged median socio-economic level. This analysis revealed the same findings: The majority of accidents occurred in the low socio-economic schools and there was no statistically significant difference in the distribution between periods.

Table 3-4

Determination of Film Program Effectiveness as a Function of School Socio-Economic Level

	Frequency of Accidents by Socio-Economic Level Quartiles 1st (highest)	2nd	3rd	4th (lowest)	Chi-Square Analysis Results
All Accidents					
Before period (n=120)	(20) 17%	(16) 13%	(25) 21%	(59) 49%	
After period (n=75)	(11) 15%	(7) 9%	(21) 28%	(36) 48%	Not significant
Dart-Out First Half					
Before period (n=38)	(3) 8%	(5) 13%	(10) 26%	(20) 53%	
After period	(5) 26%	(2) 11%	(3) 16%	(9) 47%	Not significant

Accident Data Summary and Conclusions

The analyses of accident reduction in program cities relative to the comparison cities were restricted by low frequency of accident occurrence and high sampling variability. Thus, accident reduction could not be demonstrated using traditional statistical criteria. However, consistently greater accident reduction was observed for the film program. When participating and nonparticipating schools were compared, the film program showed a statistically significant reduction in Dart-Out First Half accidents. Decrease in enrollment and self-selection bias could not account for this reduction. These findings suggest that at least the film program did reduce accidents.

SECTION 4

REDUCTION IN UNSAFE STREET-CROSSING BEHAVIOR

A major aim in the evaluation of the anti-dart-out training programs was to determine the street-crossing behavior of children and the effect of the training on their ability to safely cross the street.

Five behavioral testings were conducted across the operational period in the two program and one comparison school systems. The same schools were visited each time. The testings in the comparison city were time-matched to the film program city testings. The film/simulator program was initiated at the beginning of the 1975-76 school year rather than in the middle of the 1974-75 school year as with the film program. This difference in phasing between the film and film/simulator programs means that the occurrence of behavioral testing was not identical between programs. For the film program, the testings occurred before and after initial training, before and after refresher training, and at the completion of the school year. The film/simulator program testings occurred before and after initial training, at the end of the school year, and before and after refresher training. These differences in the occurrence of the behavioral testings must be taken into consideration in the comparative evaluation of program effects on street-crossing behavior.

The anti-dart-out training programs taught a strictly specified safe street crossing behavior sequence designed to present a single ideal procedure which would simplify training. (A description of the behavior sequence is given on page 2-1.) Obviously, the sequence does not represent the only set of behaviors which will result in a safe crossing. Thus, the focus of this evaluation was not on the increase in the "correct" behaviors (i.e., those in conformance with the safe street crossing behavior sequence), but rather on the reduction in unsafe crossings. An "unsafe" crossing was defined as a crossing which was not judged to be "safe." A "safe" crossing was defined as having the following characteristics:

1. The child must have searched adequately in both directions prior to entering the zone of moving traffic. Adequate search was one in which the child could detect approaching traffic if it were present. Presearch (i.e., search before reaching the curb or boundary) was acceptable if the child had a clear view of traffic lanes from his presearch position.

2. The child must appear to have been searching for approaching vehicles as opposed to performing ritualized responses.

3. The child must have stopped at the curb or boundary before entering the danger zone. At least one direction must have been searched while the child was stopped.

4. No specific sequence of left and right looks was required, as long as the child had searched both traffic lanes no longer than two seconds before he entered them, i.e., had minimized the opportunity for traffic to suddenly appear between search and crossing.

5. First attention to traffic heard before being seen was acceptable.

6. A crossing was not judged to be acceptable merely because it was acceptable under the peculiar street situation (e.g., positioning of parked cars, length of clear view up and down the street, etc.). The sequence employed must have been judged to be acceptable in street settings as typically encountered.

Data Collection

Two schools in each city were selected for use in the behavioral data collection. One school was selected in each of two categories:

1. Category 1 Schools. Schools which were in the highest quartile of all schools in the system in terms of parental income. Such schools also tended to be predominantly white.

2. Category 2 Schools. Schools in the lowest quartile among all schools in the system in terms of parental income. Such schools tended to be composed of both white and non-white children, as well as children of various ethnic backgrounds.

In both cities, the program coordinator supplied ASA with the names of several schools in each category, and ASA made the final choice. Selection of the behavior test schools was made based on the availability of physical settings suitable for behavioral testings. To be considered for behavioral testing, a school had to have at least one street immediately adjacent to the school with the following characteristics:

1. Residential.

2. Two-way traffic.

3. Parking permitted at least on the side of the street further from the school.

4. Convenient exit from the school building.

5. Normally light traffic.

6. No school bus loading/unloading activities and not a public bus route.

7. Setting such that street-blocking barricades and guards would not be easily apparent from the crossing point.

8. Acceptable alternate route for traffic detoured around the test street.

9. Adequate turnaround facilities for the "plant" car.

All behavioral testings in each school and across school systems were identical in all essential features. All Kindergarten, first-, second-, and third-grade classes in the schools were tested.

Testing was conducted as follows. A small van containing a stock of Reading is FUNdamental (RIF) books, or an educational exhibit, was parked across the street from the school. Children were excused from class one-at-a-time and told to go to the van, select a book or see the exhibit, and return to class. No mention was made to the children that a street must be crossed or that going to the van was in any way associated with the training program. As the child approached the street, a data collection team member called to him/her to come to the van. Upon leaving the van, the child was encouraged to hurry back to the class.

Traffic on the street was blocked, using manned barricades. A "plant" car, driven by a team member, was employed on the child's return to provide an approaching vehicle which the child had to search for and detect. Timing of the vehicle was effected via radio contact between the plant car and the observer closest to the van. Occasionally, mistiming occurred, resulting in the plant car arriving too early or too late to be an effective target for detection. For analysis purposes, a car was considered present and threatening if it was within five car-lengths of the child at the curb/boundary or the child perceived the vehicle as threatening (i.e., detected and waited for it to pass even with a gap greater than five car lengths).

The test setting was arranged with parked cars on the van side of the street, but no cars parked within at least two car lengths on either side of the crossing point on the school side. This permitted the child to exhibit both the stop-at-the-curb and the stop-at-the-boundary behaviors taught as part of the training. Figure 4-1 shows a typical test setting.

Two independent observers were stationed in cars parked near the crossing point. The observers recorded on tape the following classes of data for each observation of street-crossing behavior:

1. Identifying information, including the name of the child, class, grade, school, test number, and date.

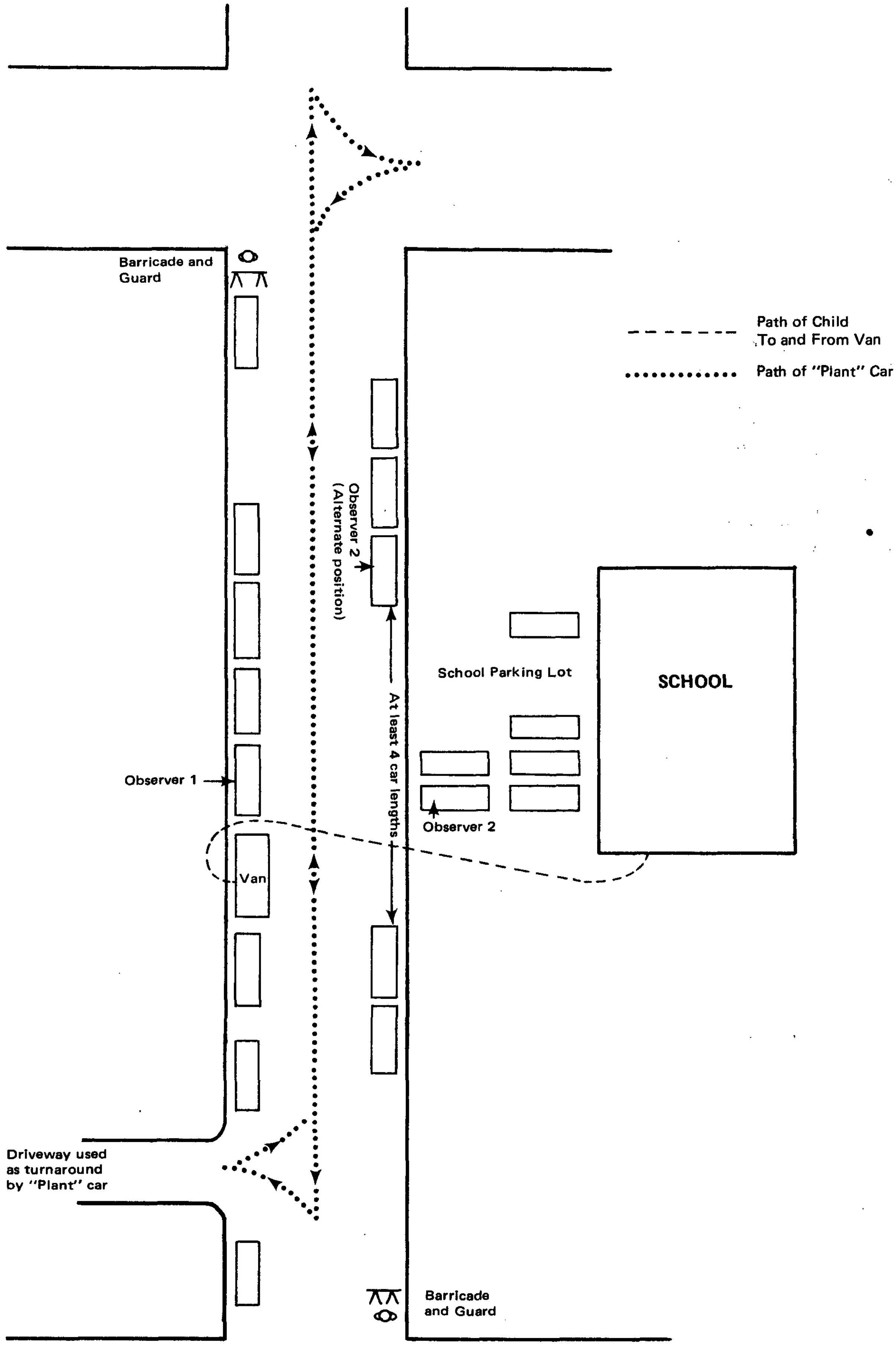


Figure 4-1. Typical Setting for Behavioral Testing

2. The temporal sequence of behaviors performed by the child as he crossed the street, including:

   a. Searches--direction and duration of each search response, including presearches, curb searches, and re-initiation of search after passage of the "plant" car.

   b. Stops--location and duration.

   c. Point of detection and response to approaching car, if present.

   d. Gap between the child and vehicle at the time of detection.

   e. Tracking behavior--present or absent.

   f. Overall judgment of the crossing--"safe" or "unsafe."

The taped data were later transcribed onto Behavioral Testing Data Collection Forms and input to the computer.

A street-crossing adequacy score was defined separately for boys and girls in each school class for each testing. The score was the simple mean of the number of unsafe crossings (0, 1, or 2) each child made during the testing. Thus, score values could range from zero, indicating that all the children in the group had crossed "safely" both to and from the van; to two, meaning that only unsafe crossings were made by the children. Overall, class adequacy scores were computed as the weighted average of the separate boys' and girls' scores. Only children present for all five testings were included in computing the scores.

Change in Unsafe Crossings Across the Operational Period

Table 4-1 shows the mean class adequacy scores for all testings in each city. The results of the behavioral testings can be summarized as follows:

1. Initial training significantly reduced the incidence of unsafe street crossing in both programs relative to the comparison school system. The film program resulted in a significantly greater reduction than the film/simulator program (40.1 percent, as opposed to 11.7 percent).

2. This reduction was maintained across the operational period for both programs.

3. Although not statistically significant ($p=.17$), there was an improvement after refresher training (i.e., between tests 3 and 4) for the film program. Refresher training resulted in little change in the film/simulator program scores (i.e., between tests 4 and 5).

Table 4-1

Summary of Behavioral Test Results

	Mean Class Adequacy Scores*				
	Test 1	Test 2	Test 3	Test 4	Test 5
Comparison Sample (n = 28 classes, 346 children)	1.632	1.749	1.520	1.403	1.473
Film Program Sample (n = 23 classes, 264 children)	1.791	1.072**	1.214	0.918	1.060
Film/Simulator Program Sample (n = 30 classes, 322 children)	1.955	1.726**	1.667	1.539	1.505

* Mean class adequacy scores are the sum of the number of unsafe street crossings observed per child (0, 1, or 2) divided by class size.

** Difference between underlined pairs of scores relative to corresponding comparison sample pairs significant at $p<.01$.

Additional analyses indicated that there was no significant difference between sexes in terms of their initial or long-term improvement. Further, no difference was demonstrated in reduction in unsafe crossings as a function of grade level.

Table 4-2 examines the changes in the street-crossing performance as the result of initial training, i.e., changes in performance between the first and second behavioral testings. It can be seen from the table that both programs resulted in improved performance, measured in terms of decreased number of unsafe crossings observed during the second test, as compared to the comparison sample. Chi-square goodness-of-fit tests show the distribution of both programs to be significantly different ($p<.001$ in both cases) from the comparison sample distribution. The film program, however, showed much greater improvement ($p<.001$) than the film/simulator program.

Table 4-2

Changes in Unsafe Street-Crossing Behavior as the Result of Initial Training

	Percent of Children Whose Number of Unsafe Crossings Between the First and Second Behavioral Testings		
	Decreased	Remain Unchanged	Increased
Comparison Sample (n=721)	12.9%	66.3%	20.8%
Film Program Sample (n=674)	53.4%	43.3%	3.3%
Film/Simulator Program Sample (n=765)	24.7%	74.1%	1.2%

It is informative to compare the behavioral improvement shown in the field test with that obtained using similar behavioral testing techniques in the pilot study.[13] The pilot test findings for the film program, which was employed in the field test in essentially unchanged form, showed that 76.2 percent of the sample reduced their number of unsafe street crossings. This compares to a reduction during field testing of 53.4 percent.

The film/simulator program, as field tested, was changed from the pilot test version by the inclusion of the safety film. This addition should have improved its effectiveness but, in fact, it did not. The program, as pilot tested, resulted in 87.2 percent of the children sampled reducing their number of unsafe crossings as compared to only 24.7 percent for the version field tested.

The difference in performance improvement between the two programs as pilot tested was not statistically significant, although the simulator program did show greater improvement. In field testing, the film/simulator program showed significantly less improvement than the film program. The film program, itself, showed less improvement during field testing than it had during the pilot test. These findings likely result, in part, from the fact that the field test teachers received far less support in the conduct of the initial training sessions than the pilot test teachers. For example, project staff were present for most of the pilot test sessions to assist and advise the teachers and, in some cases, conducted sessions themselves. This sort of support was purposely avoided in the field test so that the effectiveness of the programs could be evaluated under more realistic circumstances. A certain decrement was expected.

[13] The discussion of the pilot test behavior findings may be found in the final report of the initial study, pages 44-51. (See footnote 7, page 1-4, for the reference to this report.)

The decrease in support, by itself, cannot explain the much greater pilot-to-field test decrement exhibited by the film/simulator program. Due to the use of the traffic flow simulator, the film/simulator program is more complex than the film program. It appears that, for this reason, withdrawal of the special support was particularly devastating to the behavior effectiveness of this program.

Analysis of Street-Crossing Errors Across the Operational Period

In addition to evaluating the change in frequency of "unsafe" street crossing with training, it was also important to determine the types and prevalence of various errors and error combinations before training, and changes as a result of training. It was believed that errors analysis could identify serious errors/error combinations which still existed after training and could, therefore, lead to modification of training emphasis to counter them.

In performing the analysis, only from-van crossings were included for those children who experienced a threatening vehicle present in all five testings. The presence of the threatening vehicle meant that the children had to exercise the entire sequence, including waiting and re-initiating searches, in order to be considered as behaving correctly. The errors were based upon deviations from the "correct" model, i.e., exact conformance with the safe street-crossing behavior sequence.

There are eight major error types:

1. Failed to stop correctly, but performed all other activities.

2. Failed to search correctly, but performed all other activities.

3. Failed to wait for approaching vehicle to pass, after stopping and searching correctly.

4. After the threatening vehicle passed, failed to re-initiate the search behaviors until a completed left-right-left sequence could be performed without detecting a vehicle.

5. Failed to stop or search, but did wait for the threatening vehicle while walking and did re-initiate search.

6. Failed to search and re-initiate. The child did stop and detect a threatening vehicle (i.e., heard it), waited, but failed to re-initiate search after the vehicle passed.

7. Stopped, but failed to search and crossed before the threatening vehicle passed.

8. Failed to stop, search, or wait for the threatening vehicle and proceeded in front of it.

In addition to the error types listed above, certain minor errors in the performance of the accident avoidance behavior sequence were observed duing testing. These were generally not recorded by the observers as an error unless they were the only error committed during the crossing, although these minor errors commonly occurred in combination with the above errors.

The most important of the minor errors in terms of its prevalence is "tracking." A tracking error occurs when a child fails to watch the threatening vehicle as it approaches before re-initiating search. The tracking behavior was originally included in the behavior sequence to assure that the child had permitted the threatening vehicle to completely pass by and not be blocking his/her vision before re-initiating search. Tracking was the most common error identified during the pilot testing, and it was determined then (and reaffirmed in the subsequent behavioral testing) that the search could be effectively re-initiated by children who did not track. Tracking continued to be included in the behavior sequence essentially to provide a "filler" activity for the child while the threatening vehicle passed.

Table 4-3 provides a summary of error type frequency by condition and test. The table shows that:

1. For the control condition, little change in the distribution of error types occurred.

2. For both the film program and film/simulator program, major changes in error distribution did occur. The frequency of the stop/search/wait/re-initiate error type, the most common and serious error, decreased markedly.

3. For the film program, the number of minor errors (almost exclusively tracking errors) increased. This increase is a function of the fact that tracking errors were only recorded when they were the only error in an otherwise correct crossing.

4. For both the film and film/simulator programs, the percent of re-initate errors rose markedly.

The decrease in the proportion of stop/search/wait/re-initiate error types, combined with the increase in the percentage of re-initiate errors, signals a need for modification to program content. Apparently, children are learning to stop, search, and detect initially, but not to re-initiate search after the threatening vehicle passes. Comparing the film and film/simulator re-initiate errors across the first (pre-initial training), second (post-initial training), and fifth testings provides further

Table 4-3

Percentage Distribution of Street Crossing Error Types
by Condition and Test

	(1) Stop	(2) Search	(3) Wait	(4) Re-initiate	(5) Stop & Search	(6) Search & Re-initiate	(7) Search & Wait	(8) Stop, Srch., Wait & Rein.	(9) Track & Minor Errors	None
Comparison Sample* (n = 346 children)										
Test 1	-	-	1.07%	47.86%	-	6.79%	0.36%	41.36%	3.57%	-
Test 5	-	.91%	-	56.80%	-	5.44%	3.93%	32.02%	.91%	-
Film Program Sample* (n = 264 children)										
Test 1	-	-	.41%	36.07%	-	4.10%	1.23%	56.56%	1.64%	-
Test 5	-	1.58%	-	55.73%	.40%	8.70%	-	25.69%	7.11%	.79%
Film/Simulator Program Sample* (n = 322 children)										
Test 1	-	-	-	30.13%	.32%	-	-	69.55%	-	-
Test 5	-	.32%	-	63.38%	.32%	3.18%	-	28.98%	3.82%	-

*Sample includes only from van with car present observations for children present at all five testings.

information. The percentages for the film program first, second, and fifth testings are, respectively, 36.07, 46.54, and 55.73; for the film/simulator program 30.13, 40.62, and 63.38. It is apparent that for both programs re-initiation errors continued to increase over time following initial training. The proportion of stop/search/wait/re-initiate errors for both programs remained essentially constant between the second and fifth testings. These data indicate that there was a tendency for re-initiation behavior to extinguish over the program operational period. That is, insufficient practice of re-initiation was being provided in the refresher training and follow-on activities. Clearly, program content must be modified to correct this problem and a recommendation to this end is discussed in Appendix C.

Behavioral Data Summary and Conclusions

Both the film and film/simulator program students showed reduction in unsafe street crossing behaviors with training. However, the film program reduction was significantly greater. The reduction for both programs was maintained throughout the program operational period. Analysis of the errors made by the children indicates that training should be modified to increase emphasis on re-initiating search after a vehicle has passed and before crossing.

SECTION 5

PROGRAM DEVIATIONS AND USER ACCEPTANCE

One objective of the field testing was to install the programs in their respective school systems and allow them to operate with as little outside interference as possible. Detailed manuals were provided to the program coordinator, school principals, and teachers for each program. These guides were designed to provide all the information necessary to administer the program. The deviations from prescribed procedures in coordinating and administering the programs, therefore, provide an indication of aspects of the programs which may be impractical or unworkable in typical school systems.

Also, students' and teachers' attitudes toward the anti-dart-out training were critical to the success of the program in actual practice. Therefore, it was considered desirable to collect in both program school systems a sample of students' and teachers' attitudes toward their particular program alternate.

This section describes these data collection activities and discusses their results. Detailed discussion of the deviations and user attitudes is probably of interest to only a few readers. For this reason, only the principal results are discussed in this section. Data tables in support of the results are contained in Appendix B.

Administrative and Program Deviations

The deviations data were compiled and categorized at two levels. The first related to deviations in the overall administration of the program and the second to deviations in the conduct of individual program activities. The deviations noted in the administration of both programs can best be described and compared in four categories--coordination, transportation of program materials, conduct of initial training, and conduct of refresher training. The deviations in actual program activities fall into two categories--conduct of initial/refresher training and conduct of follow-on sessions. All of these categories are discussed below, following discussion of the data collection approach.

While these subsections describe the problems experienced by the program school systems in implementing their respective program alternates, the discussion is in no way intended to reflect criticism of the school systems. They were asked to implement experimental programs with incompletely tested procedures and materials. These school systems are typical of the majority of public school systems throughout the United States.

Their operational and budgeting constraints are not unusual. Therefore, the problems observed must reflect the adequacy of the program alternates and the success with which they can be implemented in typical school systems.

Data Collection

Deviations data were collected by means of:

1. Session observations conducted in a sample of schools in each program school system. Observations were conducted during both initial and refresher training, using a sample of 4-6 schools in each school system. Each program session was observed across a sampling of grade level and classes within schools.

2. Questionnaires sent to all participating teachers and principals. One questionnaire covering the entire operational period was employed for the film program schools. Two questionnaires, one after initial training and one after refresher training, were used for the film/simulator program.

3. Frequent informal contacts with school system personnel throughout the operational period.

Coordination

The first of the administrative deviations relates to program coordination. The program was designed to be administered by a single individual who was responsible for making arrangements to implement the program in the individual schools, and for overseeing the conduct of the program while it was in progress. For the film program, a coordinator was provided and coordination activities were carried out essentially as planned. The film/simulator school system was unable, due to budget limitations, to provide a single coordinator. Instead, five individuals shared responsiblity for coordination of tasks other than transporting of materials. Each coordinator was responsible for a small number of schools and each operated relatively autonomously.

Transportation of Program Materials

Transportation of program materials to individual schools, and of the shared materials between schools, was an important task in the administration of the programs. In the film program school system, materials were transported by the school system in an effective manner using the school system's existing vehicles and personnel. The film/simulator school system discovered that they did not have enough large trucks or personnel available for transporting the large simulator boxes. Outside help had to be contracted to provide for initial distribution of materials, transport of shared materials between schools, and collection of materials.

Conduct of Initial Training

Deviations in the general conduct of initial training can be discussed under three headings, as presented in the paragraphs to follow.

School Cooperation. As noted previously, individual schools were not required to participate in either program. In the film program school system, seven schools declined to conduct initial training; in the film/simulator school system, 22 declined. A tabulation of reasons for refusal is presented in Appendix B, Table B-1. A major reason for refusal was lack of time for implementing the program due to other school programs. Equally important for the film/simulator program was lack of space and/or physical facilities for using the simulator.

Extent of Deviation in the Conduct of Initial Training. Based on questionnaire data and follow-up calls to the schools, each participating school was rated as to the extent of deviation, class-by-class, in the conduct of initial training. Three rating categories were employed--adequate (i.e., few and/or non-critical) deviations, moderate deviations, or substantial deviations. All of the film program schools were judged adequate. However, only about half (57 percent) of the film/simulator program schools were judged adequate with one-third (33 percent) judged as having substantial deviations (see Table B-2 in Appendix B).

A large number of film/simulator schools deviated substantially despite the fact that one-half day of training was provided to a representative of each of the participating schools. The training, however, covered set-up and operation of the simulator and not the conduct of program sessions. The data indicate that presence of the simulator was, in fact, not a major factor. Rather, it was non-use of the simulator, coupled with failure to properly conduct sessions not involving the simulator that accounted for the substantial deviations. Thus, it is probably a combination of factors--ineffective coordination and the intimidating nature of the simulator--that explain these deviations.

Time Required to Complete Initial Training. According to the planning guidelines as provided in the Coordinator's Guide, it should have taken 12 weeks to conduct initial training in the 52 film program schools. Initial training was completed in 13 weeks. In the 63 film/simulator schools, initial training should have been completed in 16 weeks; it required 23 weeks to complete. This extreme delay in the film/simulator program can be attributed to two problem areas:

1. Lack of Effective Coordination. Many of the schools had not heard from their assigned coordinator and were unaware of their deadline for completing the initial training. A number of schools received the equipment at a difficult time in their schedules. Other schools did not wish to perform the program after receiving the equipment, but did not know who to contact to return it. Equipment remained unused in these schools for many weeks.

2. Transfer of Equipment. A crew of two could move only three to five sets of simulators in any one day.

Conduct of Refresher Training

The deviations in the general conduct of refresher training can be discussed under the same three headings as initial training.

School Cooperation. Of the 52 schools in the film program school system which conducted initial training, 14 declined to conduct refresher training; of the 42 schools conducting the film/simulator program initial training with moderate or better deviations, 18 declined. Reasons given for refusal to implement refresher training are summarized in Table B-3 in Appendix B.

A major reason for refusal was lack of time to implement the training. Equally important was the objection to teaching children to cross midblock. Although time was also a major factor for refusal to conduct initial training, objections to midblock crossing did not arise until after program implementation. Evidently, schools which elected not to initiate the program were not familiar enough with the concepts of the program to develop this concern. The midblock crossing issue was of greater concern in the film program schools. A few schools in that city objected to the demand on their time to participate in a program that they did not consider to be worthwhile. Space and equipment were again cited as problems for the film/simulator program.

Extent of Deviation in the Conduct of Refresher Training. No serious deviations were identified among any of the schools in either school system which elected to continue to implement the program. This finding is not surprising considering the fact that refresher training is an abbreviated version of the initial training, with no new content or procedures (see Table B-4 in Appendix B).

Time Required to Complete Refresher Training. According to the guidelines provided in the Coordinator's Guide, it should have required 10 weeks to perform refresher training in the film program schools. Refresher training in these schools required 12 weeks. For the film/simulator school system, refresher training was expected to require 14 weeks. In fact, it required 18 weeks, although only 24 schools actually conducted refresher training. This delay in the film/simulator program was caused by problems with coordination and transfer of equipment similar to those discussed above with regard to initial training.

Deviations Noted During Session Observations

Session observations conducted in the program schools during initial and refresher training indicated that the sessions were seldom conducted in exact conformance with the instructions set forth in the Instructor's Guide. Table B-5, in Appendix B, summarizes and compares the program conduct deviations and problems noted during the session observations. While the deviations are numerous and many were observed frequently, most are of minor importance to the effective training of the accident avoidance behavior sequence. Those judged to be of primary importance are as follows:

1. Improper or inconsistent reinforcement of the behavior sequence. This includes problems such as no reinforcement provided (26 percent/12 percent)[14], inconsistent reinforcement (29 percent/31 percent), children permitted to finish on an incorrect response (23 percent/58 percent), and only punishment of incorrect response provided (0 percent/23 percent).

2. The difficulty in maintaining control of the classes during the sessions. Children exhibiting boredom (48 percent/46 percent) and children being rowdy and difficult to control (52 percent/81 percent) were the subtypes most often noted.

3. Problems with the pusharound cars used in the film program, and with the simulator. Problems with the pusharound cars used in the film program included noise (55 percent) and breakage (58 percent). In the film/simulator program, the simulator was a source of problems (62 percent) as was the large car mockups used with it (46 percent).

Deviations in the Conduct of Follow-On Activities

Both program alternates required that follow-on activities be conducted. Because of the difference in the phasing, the opportunity for film program follow-on activities occurred mostly after refresher training, i.e., in the second and third semester of the three semester operational period. For the film/simulator program, the majority of follow-on opportunity occurred after initial training, i.e., in the first and second semester of the operational period. Data on follow-on activities were collected by means of questionnaires sent to all participating schools in both school systems, with telephone follow-up as required.

Deviations in follow-on activities were of two basic types:

1. The extent to which activities were conducted. For the film program, 35 percent of the teachers responding said they conducted at least one follow-on activity after initial training and 29 percent reported conducting at least one activity following refresher training. The comparable figures for the film/simulator program are 54 percent and 60 percent.

[14] The numbers in the parentheses refer to the percent of the total number of observed sessions in which the problem was noted for the film program and film/simulator program, respectively.

2. The type of activities conducted and the extent to which activities involved active practice of the behavior sequence. The major findings may be summarized as follows: For both follow-on periods (i.e., post-initial and post-refresher) and both programs, the teachers overwhelmingly preferred to repeat initial training sessions to developing new activities. For the film program post-initial training period, 74 percent of the reported follow-on activities were repeats of the initial training games and 79 percent of the activities in the post-refresher period were repeats from the initial training. The comparable figures for the film/simulator programs were 83 percent and 90 percent.

3. In accordance with the recommendations in the Instructor's Guide, teacher-invented activities more often involved active practice as opposed to passive learning. The tendency was stronger for the film program where 76 percent of the teacher-invented activities involved active practice as opposed to 54 percent for the film/simulator program.

See Tables B-6 and B-7, Appendix B, for the relevant data summaries.

User Acceptance

The anti-dart-out training programs may be conceived as having two users--the teachers who implement them and the students they are designed to impact. One goal of the evaluation effort was to collect data on the students' liking for the programs, as well as the teachers' attitudes toward the various program activities and materials. The goal of this effort was to collect data which would lead to improvements in the content and structure of the program and materials.

Data Collection

Students and teachers in four of the film program schools participated in user reaction data collection activities immediately after completing the initial training sessions. To the extent possible, those same students and teachers were interviewed later for their reactions to refresher training. At the end of the operational period, the teachers were also asked to complete questionnaires emphasizing reactions to follow-on activities and to the program as a whole.

Two schools were selected from the Category 1 schools and the two remaining from Category 2 schools. (These categories defined on page 4-2.) Two of the schools from each subsample were also used for the behavioral data collection.

The student sample for the initial interviews included 474 children from all of the K-3 classes in the four schools, and included a balanced representation of race, sex, and grade. The sample for the post-refresher interviews involved 251 first- through third-grade children who had been previously interviewed.

During the interviews themselves, precautions were taken to avoid biasing the children's responses. To control for interviewer-related bias, the interviews were conducted by the same ASA staff member; and, although the interviews were done orally, the format was highly structured and the questions were not varied. To avoid having children who had already been interviewed contaminate the responses of the others, each teacher was provided with the list of students selected and asked to send them, one at a time, to a designated area outside of the classroom. In addition, each child was instructed not to speak with the others after he/she completed the interview and returned to the room.

Two methods were used to gather data on the reactions of the teachers to initial and refresher training--a Program Reaction Questionnaire and a group interview session. The questionnaire was developed to measure the teachers' attitudes towards the following characteristics of the program:

1. Effectiveness of the program.

2. Perceived permancency of the program.

3. Worth of the program as a function of the work required to administer it.

4. Suitability of the program to the age of the children for which it is intended.

5. Adequacy of program materials.

It consisted of five questions, each offering a set of five-point scale items as alternatives, allowing the teachers' responses to be easily quantified. Space was also allotted after each question and at the end of the questionnaire for the teachers to provide comments and suggestions.

The questionnaires were distributed to the teachers early in the morning of the day scheduled for that school's group interview sessions. They were collected at the beginning of the session. The principal and all K-3 teachers were invited to be present for the session. Once the session was underway, an ASA staff member separately reviewed the intent of each session in the training program and asked the group for comments/suggestions. Their responses were recorded on a data collection form. All program materials were similarly reviewed and discussed, with comments recorded. When questionnaire and group interview data had been collected, a content analysis and tabulation was made of the comments/suggestions volunteered.

The teacher reaction data collection at the end of the program was conducted by means of a questionnaire which repeated the items in the Program Reaction Questionnaire and asked for criticisms and suggestions for program improvement based on an overall view of the program.

Procedures identical to those used in the film program schools were followed to gather user reaction data from students and teachers involved in the film/simulator program. However, data were collected in only three New Orleans schools after initial training, as it was discovered that one school had not performed the training. One of the three remaining schools declined to participate in refresher training. Therefore, two additional schools were selected for the second user reaction interviews. Three hundred seventy-one (371) first- through third-grade students were interviewed in New Orleans after refresher training. Approximately half of them had been interviewed during the previous user reaction data collection. Again, teacher opinions and comments were solicited at three points in time.

Student Reactions to the Program

The findings from the student interviews can be summarized as follows:

1. The overwhelming majority of the children liked the program a great deal, very few disliked it. This held true for both interviews across both program alternates. For the film program, 77 percent of the children indicated "liked a lot" both after initial and after refresher training. The film/simulator program children indicated "liked a lot" 80 percent after initial and 85 percent after refresher training.

2. The best liked activity in the film program, both after initial and refresher training, was the games played outside. For the film/simulator program, the best liked activity in initial training was the inside game playing. However, after refresher training, inside activities were liked least. This reversal may be explained by the different nature of the inside activities during initial and refresher training. During refresher training, no games are played indoors, the children merely practiced the sequence with the simulator. Perhaps, the children preferred playing games with the simulator to playing games outside, but preferred playing games outside to just practicing with the simulator. It is also likely that the simulator lost its special appeal over time.

3. The best liked games during initial and refresher training were the "Follow-the-Leader Game" and the "Ball Toss Game." The "Shuttle Game" was liked least during initial training and omitted from refresher training.

No important differences were observed between interviews or between programs as a function of grade, sex, or socio-economic variables. Table B-8, Appendix B, summarizes the student interviews.

Teachers' Reactions to the Programs

Teachers' criticisms of the program alternates were summarized and rank-ordered according to their frequency of occurrence. Although the teacher reaction group interviews and questionnaires were the primary source of teacher comments, feedback volunteered by teachers also was recorded during session observations and compiled from the follow-on and deviations questionnaires distributed to all participating teachers in the program school system. The summary thus provided an overall picture with all of these sources considered. Table B-9, Appendix B, summarizes the complete listing of teachers' criticisms.

Clearly, the major problem area mentioned by the teachers in both programs had to do with the equipment. Equipment problems were also a frequently observed problem during session observation. In the film program, the pusharound cars were noisy and began to pull apart during initial training. The cars were hinged to fold flat for storage, and the plastic hinges either failed or detached. The cars were rebuilt prior to refresher training, including the installation of rubber (instead of plastic) casters to reduce rolling noise.

The problems with the simulator were of three major types:

1. Real malfunctions. These were normally of a minor easily correctable nature, such as a burned-out projector bulb.

2. Apparent malfunctions, i.e., malfunctions resulting from failure to follow the set-up and operation instructions provided with the simulator.

3. Synchronization problems, i.e., getting the two projectors to operate such that the effect of a vehicle approaching on one screen then continuing away on the other screen was established. Procedures for synchronizing the films and projectors were provided in the simulator instruction manual.

It should be noted that apparent malfunctions and synchronization problems were reported even though training directed to these concerns was provided for a representative of most of the participating schools prior to initial training.

The time-consuming nature of the program ranked high as a criticism in both programs. This problem was also an important reason reported for schools which declined to conduct initial and refresher training.

The film/simulator teachers mentioned lack of space (also observed during session observations), and insufficient physical facilities as primary concerns. A major facilities limitation was lack of a space which could be darkened sufficiently to project good images while providing enough illumination to conduct the session activities. Space limitations were mentioned much less frequently by the film program teachers.

The film program teachers were concerned about the extent to which the training would transfer to real-life situations, i.e., whether, in fact, the children would learn to stop and search before darting into the street during play. The film/simulator teachers did not mention this problem very often.

The objection to midblock crossing was mentioned with moderately high frequency overall, with the film program teachers showing a more pronounced concern. Likewise, the need for an aide to assist in the conduct of the sessions was an important concern to the teachers in both programs.

Table 5-1 summarizes the Program Reaction Questionnaire scores for the teachers in both program alternates. As noted previously, the questionnaires were completed by the teachers after initial and refresher training, and at the end completion of the program.

Table 5-1

Summary of Teachers' Attitudes Towards the Programs*

	After Initial Training		After Refresher Training		At the End of Program	
	N	Mean Score	N	Mean Score	N	Mean Score
Film Program	38	1.91	18	2.23	12	2.10
Film/Simulator Program	46	2.23	22	2.34	21	2.36

*The range of possible scores was 0 to 3.8 (most positive attitude).

It can be seen from the table that:

1. Initial attitudes of the teachers sampled were more favorable for the film/simulator program than for the film program. This may have resulted from the fact that the film program schools' teachers usually conducted the sessions themselves; in the majority of the film/simulator schools sampled, a single teacher conducted all sessions in his/her school.

2. The attitudes of teachers toward both programs improved with continued exposure to the program.

Deviations and User Acceptance
Summary and Conclusions

The film program was administered essentially as planned, but coordination and transportation of the simulators posed major problems for the film/simulator program. Conduct of the initial and refresher training took far longer for the film/simulator program, a larger proportion declined to conduct initial training and to continue with refresher training. Far more of the film simulator schools conducted initial training with substantial deviations. Clearly, the film/simulator program was more difficult to administer and was, in fact, less effectively administered. It is reasonable to assume that the poorer accident reduction and behavior change performance of the film/simulator program resulted from this difficulty in administration.

Students liked both programs very much. There is some indication that the simulator may have had a special appeal to the children during initial training that disappeared over time.

Teachers in the film program initially showed a less positive attitude toward their program, but their assessment improved over time.

SECTION 6

DISCUSSION AND RECOMMENDATIONS

The previous section presented the results of a variety of data collection efforts intended to permit the selection of one of the two program alternates as being the more effective, and suggest areas where the more effective program can be improved. In this section, a decision is made concerning the preferred program alternate, and that decision is defended by discussion of the data. Recommendations, again supported by the field test results, are then presented defining necessary modifications/additions to the selected program alternate. Finally, a discussion is provided concerning certain general issues which may affect the long-range success of the anti-dart-out training as a pedestrian accident countermeasure. The discussion also applies to other yet-to-be-developed countermeasures.

Selection of the Preferred Program Alternate

After consideration of all data, the decision concerning which is the more effective program was made in favor of the film program. This decision is based on several factors:

1. Accident Data. The following results support the superiority of the film program:

    a. There was a consistent tendency across all accident type groupings for the film program to show greater before/after reduction in accidents to 5-9 year olds. The reduction is greatest (42.6 percent) for the Dart-Out First Half accident type, as would be expected by the fact that this is the primary accident type the program is designed to combat.

    b. Film program schools offering training show statistically significant reduction in Dart-Out First Half accidents as compared to the schools in the school system which did not offer training. The other film program accident groups showed a similar trend, but the differences were not significant. No such trend was observable in the parallel film/simulator program data.

2. Street-Crossing Behaviors. When the street-crossing performance of the same group of children was followed over the program operational period, it was found that:

   a. Both programs resulted in a significant decrease in unsafe street crossings (comparing measures taken before and after initial training) relative to the comparison schools.

   b. The film program resulted in a much higher reduction than the film/simulator program--40.1 percent reduction versus 11.7 percent.

   c. In both programs, this reduction was maintained across subsequent testings, i.e., throughout the operational period.

3. Administrative Deviations. The film program was administered as originally intended, i.e., with no major deviations. The film/simulator program school system faced a major problem in implementing the program. Because of the size of the boxes containing the simulators, the school transportation facility was unable to provide transportation of the simulators between schools. Transportation of the simulator poses special problems for school system transportation personnel. A large truck and two persons are required to move the equipment. The pusharound cars used in the film program can be transported in a station wagon or panel truck.

4. Program Conduct Deviation. The film and film/simulator program shared a variety of problems related to the actual conduct of the training. A major problem unique to the film/simulator program, as recorded in session observations and from teacher criticisms, is facility limitation. Often, the film/simulator school system elementary schools did not have sufficient space available in which to set up the simulator and properly conduct the inside sessions. Where space was available, often it could not be selectively darkened, as required for proper projection, while maintaining sufficient illumination to conduct the session activities.

5. Teacher Attitudes. While the film/simulator teachers initially had a more positive attitude, this was likely an artifact of the sampling. In most of the film/simulator schools where teacher reaction data were collected, conduct of all program sessions was the responsibility of a single teacher. Thus, most of the film/simulator program teachers surveyed were not deeply involved with the program and any of its attendant problems/responsibilities. On the other hand, the

attitudes of the film program teachers (who, in all cases, administered the program themselves) improved over time, reducing the initial difference. Apparently, these teachers came to appreciate the program more as they became more familiar with it and after the heavy time demands of initial training were behind them.

6. Student Attitudes. Student attitudes toward both programs were initially very positive and did not change over time. Initially, the film/simulator program children preferred the inside training sessions (involving the simulator), but, in the subsequent survey, they preferred the inside training least. The film program children preferred the outside sessions in both surveys. Possibly the simulator has a motivational effect on the children, but this effect disappears as they become accustomed to it.

From the point of view of cost and complexity to administer, the film program is clearly preferable. Administrative data compiled during the conduct of the field test indicate that:

1. The pusharound cars used in the field testing can be produced in quantity for about \$600-\$900 for a set of three; the simulators will cost about \$3,000-\$4,000 each. Simpler versions of the cars can be employed which will greatly reduce their cost.

2. The simulator requires about one day's training and practice to be effectively set up and operated. Even with such practice, some teachers are intimidated by its seeming complexity.

3. Initial set up of the simulator requires about 30 minutes and two persons. In schools where the simulator must be partially disassembled after each training session to make room for other activities, about 40 additional minutes (for disassembly and reassembly) are required. There is no appreciable assembly/disassembly associated with the film program sessions.

Modifications to the Preferred Program

A variety of modifications are recommended for the film program based on the results of the field testing. The objective of these changes is to increase the effectiveness, acceptability, and ease of implementation of the program without compromising its basic theoretical framework. Modifications/additions to the film program were designed, for the most part, to counter the following problems/criticisms identified during field testing:

1. The failure to conduct follow-on sessions, or to conduct them far less frequently than is desirable. Recommendations were made for modification to the Teacher's Guide to provide more emphasis on why follow-on activities are important and suggestions for specific activities.

2. The teachers' concern over the time required to implement the program. Recommendations were made for changes in the program content/structure to make it easier to implement. The most important recommendation, however, was to use specialists instead of the classroom teacher to conduct the program.

3. Adequacy of the program materials, especially the construction of the pusharound cars. Changes and deletions in the program materials were recommended and drawings provided for improved pusharound cars.

4. Deviations in the administration of the program and conduct of program sessions. Recommendations were made to reduce deviations through improved training. Three new training materials were developed:

   a. Coordinator's Training Curriculum.

   b. Instructor's Training Curriculum.

   c. A videotape to introduce the program to administrators and teachers. This videotape would be employed in training and would also serve to introduce the program to school system administrators who might be considering implementing the program in their system.[15]

A full description of all recommendations is contained in Appendix C.

General Insights

Over the course of the program development/pilot test and the field test projects, the project staff have developed valuable insights related

[15] Draft versions of the curriculum and a pilot research-quality videotape were developed and submitted to NHTSA as part of this project. As of the publication date of this report, no decision has been made concerning further development of these materials.

to the program, its administration, and its evaluation. These insights may prove helpful in the development of other training countermeasures in pedestrian safety. Some of the insights have been embodied in the previous recommendations; others of a more general nature are outlined below.

Program Conflict With Existing Pedestrian Safety Programs

The anti-dart-out program, because it addresses midblock crossing, comes into conflict with accepted child pedestrian safety content, i.e., cross-at-the-corner, cross-with-the-light, and cross-with-the-crossing guard. If it is to be generally accepted, the program cannot ignore this discrepancy. The program must include the accepted content and logically integrate it with the anti-dart-out content. The modified program as outlined previously addresses this concern only by advising school personnel that these traditional pedestrian safety messages can be included in the program at their option. The anti-dart-out training program should eventually be modified and extended to provide research-proved content for training intersection crossing. In general, future training countermeasures must take accepted safety content into consideration, especially where the proposed and existing contents conflict.

Program Content and Jaywalking

Because the anti-dart-out content involves midblock crossing, it may conflict with local jaywalking ordinances. The school system may be unwilling to implement the program for this reasons. In actual fact, no actual conflict may exist because:

1. Residential streets where children usually cross may not be included in local jaywalking ordinances. Such codes often apply only in business districts, specifically identified streets/highways, or "between adjacent intersections at which traffic-control signals are in operation . . ."[16]

2. The existing ordinances may be considered by local authorities to be outmoded and/or generally not enforceable.

The anti-dart-out program does not address jaywalking because it adds needless complication. Older children, however, could be taught where in their community it is illegal to cross midblock.

As a general concern, ordinances regulating pedestrian movement (e.g., hitchhiking) must be considered in developing training to assure that any

[16] Uniform Vehicle Code, Section 11-503(c). See Pedestrian laws in the United States, Traffic Laws Commentary, 3, 3, p. 98. Washington, DC: U.S. Department of Transportation, National Highway Traffic Safety Administration, October 1974.

conflict between the law and the training (or its implications) is accounted for. For the anti-dart-out program, the jaywalking issue must be addressed by the school system in the process of deciding whether or not to implement the program (e.g., through consultation with local police/public safety authorities).

Gaining School System Support for the Program

Within the public school systems, safety content is typically taught at the exposure level. That is, safe practices are lectured or demonstrated, but not practiced. If practice is provided, the content is seldom practiced to the mastery level. A program, such as the anti-dart-out program, which is designed to practice safety content to the mastery level, requires the school system to spend far more than the accustomed amount of time addressing the content. The burden was felt most acutely by the classroom teacher, who, in the original anti-dart-out program, was required to perform all program activities in addition to his/her normal activities. The result too often was ineffective performance and/or resentment.

It is difficult for an outsider, attempting to persuade a school system to implement a new program, to properly gauge the impact of the new program on the present work loads of school personnel affected by the program. Sometimes the school system officials themselves do not take the work load impact into consideration in making a commitment to implement the program. In general, persons implementing a training program in the public school systems should consider the following facts:

1. Any additional work load is likely to be considered as a burden by the affected personnel.

2. Adjusting the assignments of affected personnel to return them to normal levels may permit effective program conduct without negative attitudes. However, activities displaced by the program will suffer. The school system must be aware of this consequence in advance of program implementation and be willing to tolerate it.

3. As discussed below, the use of specialists rather than the classroom teachers to conduct all or part of the training has certain advantages. If these specialists are diverted from other activities, again these other activities will suffer. If they are new hires, the school system is faced with the problem of appropriating additional money to support them and may, therefore, be unwilling to implement the program.

In future training countermeasure field tests, NHTSA should be prepared to underwrite the cost of the program coordinator and specialists to the extent that the school system is unable to support them. This will increase the willingness of school systems to implement the program as well as increase the control that can be exerted over the operation of the program. Note that this recommendation applies only to field tests--not to demonstration projects. The proper differences in emphases between field tests and demonstrations are discussed subsequently.

Dependence on the Classroom Teacher

Future pedestrian safety training programs probably should not depends heavily on the individual classroom teachers for transmission of program content. As recommended in the program revisions (see Appendix C), the program should be taught by a specialist responsible for a number of school or by a single teacher within each school. The primary reasons for preferring this approach are that:

1. The program can get underway more quickly since fewer people need to be trained to conduct the program.
2. Higher standards of instructional quality can be maintained since program instructional personnel can be selected with greater care, more time can be spent in training them, and their work can be more closely supervised.
3. Teacher acceptance of the program is better.

To the extent that the classroom teachers actively assist the program personnel in conducting the program, they may be able to gradually take over the conduct of the program once it is operating smoothly.

The Proper Emphases for Countermeasures Field Tests

The original assumption guiding the conduct of the anti-dart-out training program field test was that the participating school systems should be provided with materials, and their administration of the program interfered with as little as possible. The program was designed to be totally self-contained, and it was important to see just how well the program was carried out given only the guidance provided by the program manuals. Experience has shown that this emphasis was wrong. In any training countermeasure similar to the anti-dart-out program, there are two major program aspects which must be evaluated:

1. The training content itself, i.e., does training produce the expected knowledge acquisition/behavior modification? Does it result in accident reduction?
2. The program administration, i.e. can the program be effectively administered given existing or typical school system constraints? Is the program acceptable to administrators and teachers?

Field testing can collect data on both aspects, but preliminary emphasis must be on evaluating the program content. Once field testing is complete and the program content proven effective, a demonstration project can be conducted. In the demonstration project, again both aspects can be evaluated, but the emphasis should be on program administration.

The most important implication of the content evaluation emphasis in field testing is that provision must be made for researchers to closely review the conduct of the program in the individual schools. They must have established an effective means of intervening promptly to correct deviations from the program curriculum. The field test must have sufficient manpower to permit project staff to observe all personnel who provide program instruction under actual operating conditions. Where classroom teachers are administering training, a good representative sample which includes teachers from each school should be observed.

APPENDIX A

ADDITIONAL INFORMATION IN SUPPORT OF THE ACCIDENT ANALYSES

ADDITIONAL INFORMATION IN SUPPORT OF THE ACCIDENT ANALYSES

The following is a discussion of the main factors affecting the choice of an approach for the accident analyses.

Non-Equivalence of Operational Periods

Originally, it was intended to compare the accident reduction of the two program alternates to the comparison city and to each other, using a single three-treatment-by-two-period design. However, as previously discussed, the film/simulator program was initiated seven months later than the film program. This meant that the two administrations were not strictly comparable, since major features of the administrations (e.g., the summer vacation and refresher training) did not occur at the same points in the respective operational periods. They were no longer comparable in an experimental design since the start and end points for the comparison before and after periods now differed, depending upon which program city was being considered. For these reasons, the decision was made to perform separate analyses of the program alternatives.

Low Frequency of Accidents

It is difficult to establish in a rigorous sense the statistical significance of the before/after accident comparisons. The problem arises primarily due to the low frequency of accidents in the cities and periods sampled.

For the present study, the best available child pedestrian accident data were collected for alternate sites. The acceptability of the sites was evaluated, based on:

1. The number of child pedestrian accidents, especially dart-out first half, projected for the operational period.

2. The percent of the total Kindergarten through third grade population enrolled in public schools. Only public school students in the K-3 grades were to receive the program and only those accident cases which involved

these children were of interest. Obviously, the larger the proportion of the total K-3 students in public schools, the better.

3. The total number of K-3 students in the school system. From the point of view of implementation costs, the smaller the school system the better, once it was assured that there was a sufficiently large accident baseline frequency in the site city to permit proper analysis.

In making the site selection, site cities were rank-ordered on these criteria and cooperation was negotiated with the most highly preferred alternates first.

At the time that site cities selection was being performed initially, selection was limited to the six cities which were included in the NHTSA/FHWA Urban Pedestrian Accident Data Base. Data for the expected before period were still being collected, and it was necessary to estimate the accident baseline frequencies for each city.

Despite careful planning, two problems were experienced which resulted in the use of site cities with smaller baseline frequencies of occurrence than initially planned.

1. The two most highly preferred cities (from the point of view of their baseline accident frequencies) were unable to participate in the study.

2. The estimates of the baseline frequencies were optimistic in some cases. For the film program, about 30 percent fewer child pedestrian accidents actually occurred in the before period than were projected.

To mitigate the problem of the low accident frequencies, data were compiled from all cities where accident data classed by accident type were available. Data were available from three cities in addition to the program cities--Akron, Ohio (in which the control data for the behavioral analyses were collected); Columbus, Ohio; and San Diego, California. By combining the data from the three cities, a more stable baseline (i.e., with lower variability) could be established against which to compare the program cities' data). Since the cities were not chosen at random, they could not comprise a control condition in the strict sense. However, the selection of the cities did not knowingly introduce biases. The cities did differ in size, accident rate for the 5-9 age group, location, and climate. This was not considered a drawback since the derived baseline would have grater generality as a result.

One of the cities, Columbus, Ohio, was the test site for another countermeasure (pedestrian messages) direct at dart-out accidents in the 5-9 age group. The messages were not implemented in Columbus until late in the film/simulator after period. Thus, the presence of this countermeasure did not bias the data from Columbus for use as a comparison with either the film program or film/simulator program.

This same countermeasure was under test in Los Angeles, California, at about the same time as the film program operational period. A cable television company in San Diego, California, transmits to its subscribers broadcasts from Los Angeles television stations, and, thus, some of the countermeasure messages were received by San Diego viewers. However, only about seven percent of the households in San Diego subscribe to the cable television service, and fewer would have children in the 5-9 age group. Therefore, the bias of the San Diego accident data, even assuming such messages are highly effective, could be expected to be minimal.

Before a final decision was made concerning the use of the combined comparison data, the data from each of the three comparison cities were further evaluated as discussed in the next section.

Serial Dependencies in the Data

Another problem in addition to low baseline frequency of accident occurrence, had to be faced in selecting an appropriate analysis approach--the possibility of serialdependencies in the accident data. The problem of serial dependencies arises because time data are employed--the accident analysis involves comparing accidents per month before program implementation with accidents per month after implementation. Standard statistical tests, such as the analysis of variance assume that the data employed come from a random sampling of the population in question, i.e., that the value of a given data element is unaffected by the values of other data elements in the sample. Time data involve the serial ordering of data elements and often serial dependencies are found to exist. Two types of serial dependencies or non-induced trends are of concern:

1. Seasonal variations, such as possible increase in accidents over the summer months.

2. Long-term, noncyclical variations as, for example, a tendency for accident rate to increase over time.

Where serial dependencies are known to exist, time series analysis is the statistical technique of choice. Where no dependencies are present, the data elements may be considered as independent and more common and less complex analysis techniques may be employed.

To evaluate the possibility of non-induced trends, a method of analysis was employed[1] that would simultaneously test two hypothesis:

1. That each month's accident rate is independent of the months preceding and following it.

[1] The analysis technique is documented in: Krishniah, P. R. & Murthy, V. K. Simultaneous tests for trend and serial correlations for Gaussian Markov residuals. Econometrica, 34, 472-480. The project is indebted to Dr. Krishniah of the University of Pitsburgh for his assistance in identifying appropriate accident analysis methodology.

2. That there are no long-term trends such that when the odd months' accident rates are held fixed, the even months' rates are distributed independently and normally with the conditional mean.

The analysis was performed on the before period data for all five participating cities--25 months for the film program city and 32 months for the film/similator and comparison cities. This analysis is summarized in Table A-1.

Table A-1

Analysis of the Before Period for Serial Dependencies

	Film Program City (25 months)*		Film/Simulator Program City (32 months)*		Combined Comparison Cities (32 months)*	
	F	P	F	P	F	P
Dart-Out First Half						
Independence	.085	.773	.803	.616	1.878	.193
Equal Means	.031	.859	.838	.619	5.919	.030
All Other Dart-Outs						
Independence	2.047	.189	.764	.597	.615	.547
Equal Means	4.286	.070	.351	.570	.277	.613
All Other Accidents						
Independence	.852	.614	.023	.876	.603	.542
Equal Means	.642	.549	1.0381	.262	.406	.542

*All analyses performed using transformed data as discussed subsequently.

To avoid false positives due to the number of analyses performed, the rejection criterion was set at p=.01. As can be seen from the table, none of the analyses reached significance, although the Combined Comparison Cities Dart-Out First Half Equal Means analysis reached p=.03. In order to assure that this result was, in fact, due to sampling error, the data were plotted for visual inspection. No meaningful cyclical pattern was apparent.

Given these findings, standard statistical procedures, rather than time series analyses, were deemed appropriate for use in the analysis of the accident data. Further, trend analyses (not shown) performed on the individual comparison cities indicated no differences that would preclude combining them.

The Nature of the Distributions

Theoretically, given a city with a high monthly average number of child pedestrian accidents, the frequency distribution of accidents over the before sampling period (i.e., before intervention) would approximate a normal distribution with a mean, $\bar{x}$, and variance, s^2, such that $\bar{x} >> s^2$. The accidents in the sampling periods in this case were not distributed normally but, in fact, were poisson distributions characterized by $\bar{x} \approx s^2$. The fact that the samples were distributed as poisson functions means that the use of standard parametric statistical tests is questionable. The relation between the sample means and variances implies that even if parametric tests were applied, after period accidents would have to drop essentially to zero before statistical significance could be achieved.

Table A-2 presents the means and variances for before and after period distributions of monthly accidents (all accidents) in the field test cities.

Table A-2

Means and Variances for Distributions of Monthly Number of Accidents (All Accidents)

		Mean	Variances
Comparison Cities:			
Akron	Before (25 months)	1.48	1.18
	After (23 months)	1.61	1.25
Columbus	Before (25 months)	9.64	30.99
	After (23 months)	8.61	22.88
San Diego	Before (25 months)	7.24	7.77
	After (23 months)	6.48	11.26
Film Program City			
	Before (25 months)	4.80	5.66
	After (23 months)	3.22	5.27
Film/Simulator Program City			
	Before (32 months)	3.84	5.29
	After (23 months)	2.87	5.57

Frequency distributions for events like the number of pedestrian accidents in a specified time interval have been shown to follow the poisson distribution:

$$P(k,\lambda) = \frac{e^{-\lambda} \lambda^k}{k!}$$

where k = the number of occurrences, e.g., 1, 2, 3, . . ., n; and $\lambda = \mu$ the mean of the distribution, where $\mu = \sigma^2$

The poisson distribution is used to describe the frequency of occurrence of unlikely events in a large number of independent repeated trials.

In order to test the hypothesis that the empirical frequency distribution of total accidents per month in the five cities follows a poisson distribution, the Kolmogorov-Smirnov one-sample test is used.[2] The null hypothesis is stated as follows:

$$Ho : F_i = P(k,\lambda)$$

versus

$$Ha : F_i \neq P(k,\lambda),$$

where F_i is the empirical distribution function for pedestrian accidents, and $P(k,\lambda)$ is the poisson distribution function generated by substituting the appropriate sample mean $\bar{x}$, for λ.

Separate analyses comparing the empirical and poisson distribution functions were performed for the before and after period distributions in both of the program cities and all three of the comparison cities. Table A-3 provides, as an example, the summaries of the film program city before and after periods analyses.

The first Kolmogorov-Smirnov test, as shown in the table, is used to test the hypothesis that the distribution of accidents in the film program city before period is poisson with $\lambda=\bar{x}=.480$.

The maximum absolute deviation between the empirical and theoretical cumulative distribution functions is D=0.088. For n=25 and $\alpha=.05$, the critical value for the Kolmogorov-Smirnov one-sample statistic is 0.270. Thus, the hypothesis that the film program city before distribution is poisson with $\lambda=4.80$ is accepted. The after period analysis tests $\lambda=\bar{x}=3.22$, the maximum absolute deviation D=.096, and the criterion statistic is 0.270. So again, the hypothesis that the empirical distribution is poisson is accepted.

[2] Hollander, M., & Wolfe, D. A. Non-parametric statistical methods. New York City: John Wiley, 1973.

Table A-3

Summary of Analyses Comparing Empirical
and Poisson Distributions

Film Program City - Before Period

k	f	P	CP	E	CE	|D|
0	0	.000	.000	.008	.008	.008
1	2	.080	.080	.040	.048	.032
2	2	.080	.160	.095	.143	.017
3	3	.120	.280	.152	.295	.015
4	4	.160	.440	.182	.477	.037
5	5	.200	.640	.175	.652	.012
6	6	.240	.004	.140	.792	.088
7	1	.040	.920	.096	.888	.032
8	0	.000	.920	.058	.946	.026
9	0	.000	.920	.031	.977	.057
10	1	.040	.960	.015	.992	.032
11	1	.040	1.000	.006	.998	.002
	n = 25 observations					

Testing Ha : $F \neq P(k,4.80)$
Maximum absolute deviation: .088
K-S critical value for n = 25; α = .05 : .270
Result: accept Ho

Film Program - After Period

k	f	P	CP	E	CE	|D|
0	3	.130	.130	.040	.040	.090
1	1	.043	.173	.129	.169	.004
2	5	.217	.390	.207	.376	.014
3	7	.304	.694	.222	.598	.096
4	2	.087	.781	.179	.777	.004
5	1	.043	.824	.115	.892	.068
6	1	.043	.867	.062	.954	.087
7	1	.043	.910	.028	.982	.072
8	2	.087	1.000	.011	.993	.007
9	0	.000	1.000	.004	.997	.003
10	0	.000	1.000	.001	.998	.002
11	0	.000	1.000	.000+	.999	.001
	n = 23 observations					

Testing Ha : $F \neq P(k, 3.22)$
Maximum absolute deviation: .096
K-S test critical value for n = 23; α = .05: .270
Result: accept Ho

The remaining eight empirical distributions were analyzed in the same manner. The end result was that the null hypothesis was accepted in all cases, i.e., in no case did empirical and poisson distribution differ significantly.

The implication of these results is that data transformation should be performed prior to using parametric statistical tests for the accident analyses.

The object of the transformation is to make the distributions more normal in form and remove the relationships between the sample means and variances. When treatment-level means and variances tend to be proportional, as in a poisson distribution, a square-root transformation has been shown to be appropriate.[3] By taking the square root of each score, the data can often be normalized. If any score is less than 10, a more appropriate transformation is given by:

$$x = \sqrt{x} + \sqrt{x + 1}$$

Table A-4 presents the means and variances for dart-out first half; all other accidents; and accidents for the two field test cities and the comparison group. Data are provided for the before, after, and post-operational segment of the after period. Both raw data and transformed data are presented. It should be emphasized that data are based on monthly accident rates per 10,000 students enrolled in participating schools, rather than frequency data as in the previous tables. The most obvious effect of the modified square-root transformation is that the sample means and variances are no longer proportional. Another result is that the magnitude of the transformed score variances relative to the means is much smaller. Thus, it appears that the modified square-root transformation has achieved the desired effect, and the transformed scores no longer have the undesirable properties associated with poisson distributed data.

Analyses of the Data

Having transformed the scores, the next step was to statistically compare the mean scores. The primary analyses were designed to compare the before-after difference in each program city and the before-after

[3] Kirk, R. E. Experimental design: Procedures for the Behavioral Sciences. Belmont, CA: Brooks/Cole Publishing Co., 1968.

Table A-4

Raw and Transformed Rate Data by
Accident Type Categories, Periods, and Cities

City	Accident Type Category		RAW RATE DATA Before	RAW RATE DATA After	RAW RATE DATA Post Operational	TRANSFORMED RATE DATA Before	TRANSFORMED RATE DATA After	TRANSFORMED RATE DATA Post Operational[1]
Comparison Cities[2]	Dart-Out, First Half	$\bar{x}$	.731	.564	.370	1.970	1.843	1.614
		S^2	.163	.074	.113	.188	.118	.229
	All Other Dart-Outs	$\bar{x}$	.752	.750	.649	1.988	1.970	1.857
		S^2	.204	.114	.046	.175	.156	.064
	All Other Accidents	$\bar{x}$	.995	1.054	.946	2.237	2.236	2.132
		S^2	.188	.218	.382	.157	.201	.432
	Total	$\bar{x}$	2.574	2.369	1.974	3.292	3.215	2.979
		S^2	1.083	.673	.742	.315	.454	.454
Film Program	Dart-Out, First Half	$\bar{x}$	1.450	.832	.289	2.462	1.981	1.407
		S^2	1.949	.892	.243	1.394	.925	.482
	All Other Dart-Outs	$\bar{x}$	1.588	1.425	.656	2.681	2.331	1.776
		S^2	1.364	2.931	.754	.928	1.849	.982
	All Other Accidents	$\bar{x}$	1.525	1.146	.892	2.604	2.236	1.928
		S^2	1.686	1.218	1.508	1.056	1.172	1.439
	Total	$\bar{x}$	4.562	3.403	1.836	4.380	3.698	2.764
		S^2	4.907	5.203	1.931	1.041	1.830	1.582
Film/Simulator Program	Dart-Out, First Half	$\bar{x}$	.805	.855	1.146	1.955	2.000	2.423
		S^2	.869	.882	.479	.903	.942	.514
	All Other Dart-Outs	$\bar{x}$	1.355	1.148	1.433	2.484	2.219	2.515
		S^2	1.035	1.521	1.293	.939	1.253	1.217
	All Other Accidents	$\bar{x}$	1.035	.856	.859	2.212	1.960	1.900
		S^2	1.054	1.197	1.485	.880	1.082	1.407
	Total	$\bar{x}$	3.194	2.859	3.438	3.698	3.367	3.805
		S^2	3.752	5.788	5.988	1.040	1.976	1.387

[1] The post-operational period is the last seven months of the after period when all program activities had been discontinued.

[2] For the comparison cities a given month's accident rate was taken as the mean of the rates for the individual cities.

difference in the comparison cities, using a t-test. The t-test formula we employed was as follows:

$$t = \frac{\left(\bar{X}_{pb} - \bar{X}_{pa}\right) - \left(\bar{X}_{cb} - \bar{X}_{ca}\right)}{\sqrt{\left(1/n_{pa} + 1/n_{pb} + 1/n_{ca} + 1/n_{cb}\right)\left(\dfrac{SS_{pa} + SS_{pb} + SS_{ca} + SS_{ca}}{n_{pa} + n_{pb} + n_{ca} + n_{cb} - 4}\right)}}$$

$$d.f. = (n_{pa} + n_{pb} + n_{ca} = n_{cb} - 4)$$

where $\bar{X}$ values are the mean accident rates (using transformed data) for program after period (pa), program before period (pb), comparison after period (ca), and comparison before period (cb); values of n are the respective number of months in each period; and SS values are the sums of squared deviations about the mean.

Separate analyses were performed for the Dart-Out First Half, All Other Dart-Outs, and All Other Accidents categories for each program city and were analyzed, using a one-tailed t distribution. These results are presented in Table 3-1 on page 3-4. The analyses results are also shown in Table A-5 which provides in addition the results of the analysis of all (Dart-Out plus Non-Dart-Out) accidents.

Table A-5 also shows the results of analyses comparing differences between the before and post-operational period for program versus comparison cities. The post-operational period was the final seven months of the after period, in which no program activities were ongoing. These analyses show two interesting findings:

1. Across all accident groupings the film program post-operational period accident reduction was generally greater than the reduction for the overall after period. In fact, the before versus post-operational period reduction for total accidents, as compared to the comparison cities, is highly significant (p=.01).

2. The film/simulator program showed similar pronounced reduction in the post-operational period, but only for the Dart-Out First Half accident grouping.

The data tentatively support the interpretation that there was a program intervention effect occurring for the film program. The effect appeared to have a delayed onset, showing itself later in the after period. The effect appears to generalize across all accident types, with the most pronounced effect, as might be expected, for the Dart-Out type accidents. The fact that marked post-operational period accident reduction in the film/simulator program was only observed for the Dart-Out First Half accidents may imply that:

1. There was some difference between the two program variants which resulted in the film/simulator training not

Table A-5

Summary of t-test Comparisons by
Program, Accident Type Category, and Period

		COMPARISON					
		Before vs. After Period			Before vs. Post-Operational Period		
City	Accident Type Category	t*	DF	P**	t*	DF	P**
Film Program	Dart-Out, First Half	1.065	92	.14	1.378	60	.08
	All Other Dart-Outs	.928	92	.18	1.732	60	.04
	All Other Accidents	1.119	92	.14	1.152	60	.12
	Total	1.561	92	.06	2.490	60	.01
Film/Simulator Program	Dart-Out, First Half	.575	106	.28	1.637	74	.05
	All Other Dart-Outs	.200	106	.42	.806	74	.28
	All Other Accidents	.667	106	.26	.650	74	.26
	Total	.120	106	.45	1.040	74	.43

*Each analysis compared the program city before/after difference with the parallel difference for the comparison cities.

**One-tailed test.

generalizing to other accident types. This hypothesis seems unlikely given that, with the exception of the use of the simulator, the two programs were identical.

2. The effect of the film/simulator training, i.e., the strength of the learned responses, was not as pronounced as in the film program. The weaker responses would not be expected to exhibit stimulus generalization.[4] Problems (discussed in the main text) encountered in the administration of the film/simulator program could account for the reduced effect of training.

While the findings are interesting, the analyses of the post-operational period must be interpreted with some caution for two reasons. First, the post-operational period was only seven months in duration. Second, due to the fact that the last four months of the post-operational period in the film program city extended into a third school year, first-graders were eliminated from the data for those four months. First-graders in these four months would not yet have been enrolled in school in February 1975 when the film program got underway, and would not have received training. Consequently, accident rates for those months include only the second- and third-graders. The small number of months and the reduction in the sample base have the effect of reducing the stability of the post-operational period mean accident rate.

[4] For a discussion of generalization gradients, see: Hilgard and Marquis' Conditioning and Learning, revised by Gregory A. Kimble, Duke University. Second Edition. New York: Appleton-Century-Crofts, Inc., 1961.

APPENDIX B

PROGRAM DEVIATIONS AND USER ACCEPTANCE DATA TABLES

PROGRAM DEVIATIONS AND
USER ACCEPTANCE DATA TABLES

Table B-1

Tabulation of Reasons for Refusal to Participate in the Programs

Reason for NOT Participating in Program	Film Program	Film/Simulator Program
Not Enough Time	3	4
Not Enough Space/Facilities Inadequate		4
Program Not Useful or Incomplete		2
Program Materials/Equipment Complicated		1
Not Enough Help Available to Implement Program		1
Not Informed of Program Prior to Arrival of Materials		1
No Answer/No Response	4	9

Table B-2

Summary Tabulation of Film and Film/Simulator Program Schools' Performance of Initial Training

	Adequate[1]	Moderate Deviations[2]	Substantial Deviations[3]
Film Program	52	0	0
Film/Simulator Program	36	6	12[4]

[1]Adequate. Schools were judged as having conducted an adequate program if some type of pre-program activity was done, the film was shown at least once, the children practiced indoors and outdoors, some combinations of at least three game sessions was played, and the children received either badges or certificates.

[2]Moderate Deviations. Schools were judged as having conducted a training program with moderate deviation if the indoor training sessions were adequately completed, but the outdoor sessions were not done.

[3]Substantial Deviations. Schools were judged as having conducted training programs that were substantially modified if some sessions or parts of sessions were done, but not enough to allow the school to be classified in one of the above categories. The two most common examples of substantial deviation were schools that did some type of preprogram activity, practiced indoors, but used no simulator/pusharound cars and never practiced outdoors; or schools that only had a safety discussion and showed the film.

[4]These schools were not included in the accident data analyses and did not conduct refresher training.

Table B-3

Tabulation of Reasons for Refusal to Participate in Refresher Training

Reasons for NOT Participating in Refresher Training	Film Program	Film/Simulator Program
Not Enough Time	2	3
Program Not Useful--Should Not Teach Midblock Crossing	3	2
Combination of Both of Above	4	0
Program/Materials/Equipment Complicated or Malfunctioning	0	1
Not enough Space/Facilities Inadequate	0	3
No Answer/No Response	5	9

Table B-4

Summary Tabulation of Film and Film/Simulator Program Schools' Performance of Refresher Training

	Deviations		
	Severe	Moderate	None
Film Program	0	0	38
Film/Simulator Program	0	3	21

Table B-5

Summary of Deviations and Problems Observed in the Conduct of Individual Program Sessions

	Film Program[1] (n = 31)	Film/Simulator Program[1] (n = 26)
Set-up Variation (Overall[2])	42%	69%
No aides	23%	38%
No barricade guards or guards failed to stop traffic	45%	15%
Two or more classes combined	13%	4%
No pusharounds used/incorrect use of pusharounds or simulator	42%	35%
No mockup cars used (film/simulator program)		23%
Session Variation (Overall[2])	45%	19%
Game variation	13%	35%
No competition in games	32%	27%
Play of game emphasized over correct performance of behavior sequence	10%	4%
Tokens not used or used incorrectly (i.e., children not allowed to keep tokens)	16%	35%
No reinforcement	26%	12%
Reinforcement of incorrect responses	16%	23%
Reinforcement correct but inconsistent	29%	31%
Children permitted to finish on an incorrect performance (may be verbally corrected)	23%	58%
Only punishment provided	-	23%
Tracking not taught	35%	81%
Teacher/aide crossed incorrectly	26%	27%
Problems in the conduct of the Session (Overall[2])	58%	73%
Children exhibited boredom	48%	46%
Children rowdy/problem maintaining control	52%	81%
Children found sessions difficult or confusing	3%	8%
Problems with pusharounds (broken) or simulators (not synchronized, room not dark enough, etc.)	58%	62%

Table B-5 (Continued)

	Film Program[1] (n = 31)	Film/Simulator Program[1] (n = 26)
Problems with game materials (i.e., baskets tipped over)	10%	4%
Problems with large mockup cars used with the simulator (e.g., broken, pieces missing		46%
Noise (pusharounds or simulator)	55%	15%
Inadequate space	-	19%
Local traffic a problem (outside sessions)	6%	-

[1]Figures indicate the percent of the total number of sessions in which each type and subtype was observed.

[2]Includes the percent of sessions in which one or more of the subtypes were observed, or which only a general designation was made, i.e., subtype(s) was (were) not specified.

Table B-6

Summary by Program of the Extent to Which Follow-on Activities were Performed

		Percent of Classes Which Had:	
	No. of Classes	No Follow-on Activities	At Least One Activity During Period
Film Program			
After Initial Training (1st semester	251	64.9%	35.1%
After Refresher Training (2nd and 3rd semester)	268	70.9%	29.1%
Film/Simulator Program			
After Initial Training (1st and 2nd semester)	296	56.3%	53.7%
After Refresher Training (3rd semester)	114	40.4%	59.5%

Table B-7

Summary of Type of Follow-on Activity by Program and Period

	Film Program				Film/Simulator Program			
	After Initial Training (1st Semester)		After Refresher Training (2nd & 3rd Sem.)		After Initial Training (1st & 2nd Sem.)		After Refresher Training (3rd Semester)	
Repeated Initial Training Session		73.6%		78.7%		82.6%		90.0%
Performed Teacher Invented Activity:								
Practiced Sequence During Class Trips	10.7%		6.1%		4.4%		0	
Practiced Sequence When Crossing School Drive to Playground	2.9%		4.3%		0		0	
Practiced Sequence During Physical Education Activity (Retrieve Ball from Street, etc.)	5.0%		1.8%		0.6%		0	
Practiced Sequence in Classrooms/ Gymnasiums/Auditoriums	3.6%		1.2%		2.1%		1.4%	
Practiced Sequence During Fire Drills	0		0.6%		1.5%		2.1%	
Practiced Sequence Crossing Between Parked Cars in Parking Lot	0		0.6%		0		0.7%	
Other Practice Activities	0		0		0		2.9%	
Total Practice Activities		22.2%		14.6%		8.6%		7.1%
Developed Posters/Wrote Safe Street-Crossing Stories	0		0		2.9%		0	
Had Discussions of Safe Street-Crossing	3.6%		6.7%		2.9%		2.9%	
Saw Demonstrations of Safe Street-Crossing	0.7%		0		2.9%		0	
Total Passive Activities		4.3%		6.7%		8.7%		2.9%
TOTAL REPORTED ACTIVITIES		140		164		340		140

Table B-8

Summary of the Student Reaction Data

	Film Program		Film/Simulator Program	
	Post Init.Trng.	Post Refr.Trng.	Post Init.Trng.	Post Refr.Trng.
General Attitude				
"Liked a Lot"	77%	77%	80%	85%
"Liked"	20%	16%	17%	13%
Best Liked Activities				
Film	28%	38%	22%	42%
Inside Games[1]	23%	-	53%	20%
Outside Games	48%	59%	24%	38%
Best Liked Game				
Ball-Toss	35%	55%	31%	50%
Shuttle Game[2]	18%	-	23%	-
Follow-the-Leader	46%	41%	36%	49%
Sample Size	474	251	374	371

[1] "Inside activities" were not offered as a response alternative during the film program refresher interviews.

[2] The "Shuttle Game" was not played during refresher training.

Table B-9

Summary of Teacher Reaction Data

	Film Program Rank[1]	Film/Simulator Program Rank[1]
Major Program Equipment (i.e., pusharound cars or simulator) Difficult to Use and/or Did not Function Correctly	1	1
Program is too Time Consuming	3	3
Must Have an Aide to Conduct Program	5	6
Better Coördination Should Have Been Provided to the Individual Schools	7	4
Shouldn't Teach Midblock Crossing	4	11
Children Forget too Quickly--Need More Reminders/Repetition	6	10
Too Little Space/Inadequate Facilities for Inside Sessions	15	2

Table B-9 (Continued)

	Film Program Rank[1]	Film/Simulator Program Rank[1]
The Program Learning Will Not Transfer to Real-Life Situations	2	18
Program Should be Administered in Smaller Groups	13	8
A Specially Trained Person (not classroom teachers) Should Conduct the Program	16	5
Games Not Fast Moving--Children Wait too Long for Turns, Get Bored	8	16
Games Too Difficult for Younger Children	17	7
More Time Should be Devoted to Outside Practice	14	12.5[2]
Program Should be Part of a Larger Safety Program	9	20
Children Considered the Cars/Simulators as Toys/ Distraction--Learning Suffered	10	24.5[2]
Problems in Barricading Streets (e.g., arrangements not made, motorists disregarded barricades)	26	9
Child Didn't Know Left and Right--Learning Suffers	14	24.5[2]
Training Activities Too Elementary for the Older Children	27	12.5[2]
Need More Preparation of Teachers and Parents Prior to Program	11	34
Outside Practice Should Use Actual Traffic--Streets Should not be Blocked	31	19
Program Sessions Should be Equally Spaced Over Year, i.e., No Concentrated Initial Training	37	14
No Time Available for Follow-on Activities	46	15
Not Enough Time was Allowed the Individual School for the Use of Shared Program Materials	44	17
Children Will Abuse the (Implied) Permission to Cross Streets	18	Not Mentioned
Children are Rewarded Too Easily	19	Not Mentioned
Game Baskets are Too Light and Tip Over	20	28.5[2]

[1] A total of fifty-five comments were rank-ordered for frequency of occurrence.

[2] Tied rank.

APPENDIX C

RECOMMENDATIONS FOR MODIFICATIONS TO THE FILM PROGRAM

RECOMMENDATIONS FOR MODIFICATIONS TO THE FILM PROGRAM

The changes recommended as the result of field evaluation fall into the three categories discussed in the subsections which follow. The changes recommended have been implemented in the revised materials provided in Volume 2 of this report.

Program Content/Structure

The changes which are recommended for the program activities themselves are as follows:

1. Emphasis on follow-on sessions should be increased. A list of indoor and outdoor activities beyond the repeat of initial training sessions should be defined with more specific guidance concerning the need for and importance of follow-on sessions. Follow-on activities should emphasize training to improve the reinitiate search behavior.

2. Spacing of initial training sessions should be made contingent upon grade level. Kindergarten children should, if possible, have a session every day or every other day. Follow-on sessions should occur every two weeks for Kindergarten children and, if possible, first-graders.

3. All inside sessions should be conducted in a single area within the school rather than in individual classrooms.

4. The film should be shown to all of the children in a group. The first showing could involve all grades K-3; the second, Kindergarten only.

5. Session content should be modified to provide "cross-at-the-corner" and "cross-with-the-light" advice. Practice of these concepts cannot be included as part of the anti-dart-out program content, at least at present. An accident-avoidance behavior sequence for the more complex intersection crossing (with and without lights) has not been developed and validated. Specific content directed at intersection crossing, therefore, could not be funded on a sound research base. However, program

materials should at least advise school personnel that "cross-at-the-corner" and "cross-at-the-light" content of their choice can be integrated with the program.

6. Restructure Refresher Training. The three sessions of refresher training should be structured as follows:

   a. Session 1 would involve seeing the film and inside practice without the push-around cars.

   b. Session 2 would involve inside practice of the "Ball Toss Game," using the push-around cars. No parked cars would be present.

   c. Session 3 would involve outside practice of the "Follow-the-Leader Game" with parked cars present.

   The first follow-on session would be scheduled to occur soon (i.e., one to two weeks) following the second refresher session.

7. The "Shuttle Game" is too complicated for both teachers and children. It should be replaced with another game which permits children to practice crossing while being called across the street. The game recommended is a relay race involving two teams. The children race across the street to the teacher or assistant when called, and must perform the behavior sequence correctly before crossing and during the return to their original position.

8. The remaining games should be redefined somewhat to provide simple and advanced versions to better match the capabilities of the children across different grade levels.

9. Fill-in indoor practice sessions should be emphasized for those times when bad weather prevents holding outside sessions during initial training. The specified number of outside practice sessions (i.e.) three sessions) should be conducted regardless of the number of fill-in sessions required.

Program Administration/Coordination

A variety of important changes are recommended in the way the program is administered:

1. Less emphasis should be placed on the classroom teacher for administering the program. Specially trained individuals within the school system should conduct at least the initial training. Two general options are presently visualized in addition to having classroom teachers conduct this program:

    a. Option 1. In the first year of the program, the coordinator would train one teacher in each school to conduct all program activities. This teacher's teaching assignment would be adjusted to permit him/her to devote the required time to program activities. The classroom teachers would aid in the conduct of activities. In subsequent years, the coordinator would train replacement teachers as required due to normal turnover.

    b. Option 2. For the first year of the program, trained specialists would conduct all initial training, and train classroom teachers in each school to conduct the follow-on activities. In warm climates where initial training can be conducted throughout the year, a single specialist could conduct initial training in 10-15 schools, depending upon their size. Thus, a school system with 50 elementary schools would require 4-5 specialists the first year. For subsequent years of the program, specialists would be required only for initial training of the Kindergarten and transfer students, and to supervise the classroom teachers' conduct of refresher training. Refresher training should be held early in the school year, but initial training could, in warm climates at least, be conducted school-by-school throughout the year. Under these circumstances, only the coordinator and one specialist would be required to maintain the program in a system with 50 elementary schools.

2. Regardless of option, the coordinator's tasks should include:

    a. Arranging for scheduling the conduct of the program in the individual schools.

    b. Briefing the principals concerning the program, their roles in the conduct of the program, and roles of their teachers.

    C. Training the specialists.

    d. Arranging for initial shipment of materials to the individual schools and resupplying expended/worn out materials as required.

    e. Acting as liaison between the community (e.g., parents, parent groups, the media, police, public safety organizations) and the school system in matters concerning the program.

3. Regardless of whether the specialist is training school personnel (Option 1), or actively administering the program (Option 2), his/her tasks should include:

    a. Training of teachers regarding their role in the program and gaining their support.

    b. Conduct of (supervise conduct of) various program activities depending upon the option employed.

    c. Maintenance of close liaison with the individual school to assure that program activities, especially follow-on activities, are being conducted according to plan.

    d. Conduct of initial and periodic inventory of program equipment.

   The coordinator will assume some specialist responsibilities in subsequent years of the program.

4. With either option, the principals' tasks would include:

    a. Assuring that program activities were properly scheduled.

b. Arranging for barricade guards (as required) and the blocking of streets.

c. First-level liaison with parents regarding the program.

5. The individual classroom teachers' responsiblities would be limited to:

   a. Aiding in the conduct of initial training.

   b. Conducting structured follow-on activities.

   c. Conducting refresher training.

   In Option 1, the follow-on and refresher training activities would, ideally, be conducted by the program-trained teacher. At a minimum, the teacher would conduct the activities with close support from the program-trained teacher and/or the specialist assigned to the school.

6. A set of pusharound cars, a set of barricades, and a safety film would be provided to each school, eliminating the need to transport materials between schools. Game materials would not be provided to each teacher. A school could have one or more extra sets to provide for normal breakage and loss, as well as simultaneous inside and outside sessions.

7. Program guidance must emphasize the importance of having a single coordinator, with appropriate authority, administer the program within the school system.

8. Program guidance whould emphasize total participation, especially the low income elementary schools.

Program Materials

The changes in program content and administration outlined above will necessitate changes in the program materials. Also, deficiencies in the materials noted during the operational period must be corrected. Recommendations concerning new and existing program materials are outlined below.

1. Coordinator's Training Curriculum (new material). This curriculum would address the topics to be covered in training the coordinator to conduct program activities, as well as to administer the program. Content material for the coordinator's training would derive in great part from the various guides listed below.

2. Coordinator's Guide. The Coordinator's Guide should be revised to cover conduct of the coordinator's tasks as previously listed, given the alternate program administration approaches.

3. Principal's Guide. This guide would be revised somewhat to reflect the minor adjustments in the principals' responsibilities recommended above.

4. Instructor's Guide. The Instructor's Guide should be revised to:

   a. Conform to the content change recommendations.

   b. Reflect the use of the guide both by the specialists and by classroom teachers.

   The major change in the Instructor's Guide would be the addition of specified follow-on activities.

5. Program Instructors' Curriculum (new material). This curriculum would derive from the coordinator's curriculum and would contain basically those topics related to:

   a. The program's underlying rationale.

   b. Conduct of the various program activities.

   c. The role of the specialist and the roles of the teachers and principals in the conduct of the program.

6. The "Captain Kangaroo" Film. The film should be modified with about one minute of scenes showing children crossing at the corner with a light or with a crossing guard. The original actors need not be involved, but additional narration by Mr. Keeshan will be needed. A modified script/storyboard is included in Volume 2.

7. Game Tokens. These should be larger and made of plastic. The plastic chips now used for the "Shuttle Game" would be suitable.

8. Reward Tokens. These should be made of heavy cardboard to resist crumpling.

9. Chip and Container Sets. These are no longer needed since the "Shuttle Game" has been eliminated.

10. Balls. These should be bigger with less tendency to roll. Sponge rubber or perforated plastic balls would be suitable.

11. Masking Tape. The tape should be a brighter color (e.g., yellow) to provide a greater contrast with floors.

12. Parents' Pamphlets. These should be expanded to provide ideas for parents of additional coordinated learning experiences for their children.

13. Pusharound Cars. The cars should be constructed of one piece molded plastic with noiseless rubber casters. Portability and storage can be facilitated by designing the cars so that they "nest" together. Preliminary drawings and specifications are provided in Volume II.

14. An "Introduction to the Safe-Street-Crossing Training Program" Film (new material). This film would be a 15-20 minute color sound 16mm moving picture presentation designed to:

    a. Introduce the program to school system executive staff and aid in obtaining their support for implementing the program in the school system.

    b. Brief the principals concerning the program.

    c. Provide a first program exposure (i.e., an overview) for personnel who are to be trained to administer the program.

    This film would present the need for the program, its unique features relative to existing pedestrian safety problems, and how the program addresses the problem of dart-out accident prevention. The major activities and program materials would be shown in operation.

15. "Follow-The-Leader Game" Rope (new material). A 75-foot rope, segmented into 10-foot intervals of different colors, is recommended to mark off the path of the "Follow-The-Leader Game." The rope will greatly facilitate set up of the game.

16. Unchanged Materials. The following program materials need not be modified:

    a. Barricades and signs.

    b. Game Baskets.

    c. Sew-on Badges.

    d. Safety Certificates.

    e. Progress Charts.