

Center for Education and Research in Safety

An Evaluation of the *Safe-T Rider* School Escalator Safety Program
on Children's Escalator Use in the Community

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Abstract

The *Safe-T Rider* program, which has been designed to teach escalator safety to elementary school aged children, was evaluated using a multiple baseline design across two cities: Tallahassee, Florida; and Saint John, New Brunswick. The purpose of this study was to determine if the *Safe-T Rider* program improved the behavior of pupils, grades kindergarten through 5, using escalators within the community. Program components include an instructional guide for administrators; a videotape with a character modeling safe behavior; a student activity book to be completed at home and shared with parents and siblings; a test administered after viewing the video; a lunchbox sticker; and a certificate for completing the program. Program effectiveness was evaluated by observing children using escalators located in busy shopping malls in each city. After collecting baseline data in public shopping malls in both cities, the *Safe-T Rider* program was implemented in Tallahassee while the city of Saint John remained in the baseline condition. Next the treatment was introduced in the city of Saint John. The introduction of the program was associated with improvements in a number of escalator safety behaviors in each city. In both cities the percentage of children stepping on safely, facing forward, standing clear of the sides of the escalator, standing still while riding; and stepping off carefully significantly increased. The percentage of children holding an adult's hand or the handrail remained the same. Rule violations that occurred at very low frequencies such as sitting while riding decreased but the reductions were not statistically significant.

Introduction

The *Safe-T Rider* program was first implemented in 1991 to educate children on the safe use of elevators, escalators, and moving walks. This program has received recognition from the National Safety Council, the American Trauma Society, and the American Society of Association Executives, and has been adopted by schools in 45 States and 6 Canadian Provinces. Evaluation of the program shows that it improves the safety knowledge of children who receive the program.

Although data show that program is effective in imparting important safety knowledge, the degree to which this knowledge translates into improved safety related behavior in the community has yet to be examined. The *Safe-T Rider* program teaches 7 points for safe escalator use, 4 safety points for safe elevator use, and 7 points for safe moving walkway use.

Research has indicated that safety programs (teaching safety behaviors to prevent child abduction) that involve verbal and videotape presentations that include video modeling can produce a large increase in safety related behaviors (as measured by simulated abduction attempts) but do not produce as large an effect as those that include direct skills training that involve direct practice (Poche, Yoder, & Miltenberger, 1988). However, it is difficult to role-play safe escalator use in a classroom, and the introduction of direct role playing increases the effort and training required of classroom teachers. The *Safe-T Rider* program components include an instructional guide for administrators; a videotape with a character modeling safe behavior; a student activity book to be completed at home and shared with parents and siblings; a test administered after viewing the video; a lunchbox sticker; and a certificate for completing the program. Behavioral strategies include, video modeling of safety behaviors, having parents go over the material with the children, and awarding students a certificate and sticker for completing

the home portion of the program with the workbook..

The purpose of this study was to determine if the *Safe-T Rider* program improved the safety behaviors of pupils, grades kindergarten through 5, using escalators within the community.

Method

Participants and Setting

Children between the ages of 6 and 12 and their parents served as participants in this research. Two communities were selected which were geographically isolated from neighboring communities, and which had never offered the *Safe-T Rider* program. Selection of a geographically isolated community was necessary to ensure that children during the pre-treatment phase had not yet received the program, and that the vast majority of children sampled during the post-treatment phase received the program.

The selected communities, Tallahassee, Florida and Saint John, New Brunswick were not part of a region with urban sprawl and had clearly defined boundaries. These communities also did not have a high percentage of tourists during the time period when the study was carried out, November 2003 – February 2004.

Tallahassee. This community of 150,000 is located in Leon County in Northern Florida. The Leon County school system has a population of 239,000. The *Safe-T Rider* program was administered to all public school students, (grades K-5) in the public school system in Tallahassee, Florida. There were 25 elementary schools that offered the program in the city of Tallahassee to 11,000 students.

Saint John. This community of 74,000 is located in on the Bay of Fundy in the Province of New Brunswick. The program was delivered to all of the elementary school aged children in

the English school system in School District 8 (school district population 100,000). There were 28 schools that offered the program to 5,500 students in grades K to 5 in the city of Saint John.

General Procedure

Observers were trained how to score each of the target behaviors as well as how to determine whether children fell into the height range that was used to estimate the age of children. The height range was selected using the boy and girls height and growth chart used by physicians to determine percentiles in height. Because the program was administered to all elementary school children attending public school in the target communities we decided to use a height range that would make it unlikely that children less than school age or older than grade 5 would be scored. Toward this end we selected the height range of 45.5 inches (the 95th percentile height of children five and a half years old) and 52 inches (the 5th percentile height of children elementary school children aged ten and a half years old). If the children's height fell within this height range, the probability that the child was younger than school age or too old for grade 5 was less than 5%. Behaviors were scored Monday through Friday from 3:30 PM until 8:00 PM and on Saturday and Sundays during Mall hours for a period of 6 weeks prior to the introduction of the *Safe-T Rider* program and for a 6-week period after the program was delivered. A data session consisted of either 40 observations or 2 hours, whichever came first. Data were not collected during the week that the school implemented the program because all teachers did not all implement the program on the same day.

Measures

Observers determined whether children were in the appropriate height range by referring to two marks, one for the lower range and one for the higher range, on a pole near the escalator

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entrance. The observers then used a discrete categorization checklist to score each safety behavior. To facilitate scoring, the *Safe-T Rider* programs 7 target behaviors were divided into 9 specific target behaviors. The observer checked whether the youth: 1) Stepped onto the escalator carefully – This behavior was scored if the child was looking ahead or down, walked (no running or jumping on), and was balanced while stepping onto the escalator. 2) Held handrail or adults hand – This behavior was scored if the child held the parent's hand, handrail or both while using the escalator. Children were scored for this behavior provided that he or she did not let go for a period of more than 2 seconds during the trip on the escalator. This allowed the child to engage in short behavior such as rubbing their nose, etc. 3) Faced forward – During the use of the escalator the child needed to be oriented in the ahead. Children were not scored for this behavior if they looked to their side or over their shoulder for more than a couple of seconds. 4) Stood clear of sides – The child was scored as standing clear of the side of the escalator if no portion of their body touched the side of the side wall of the escalator. 5) Shoe fastened & no loose clothing – This behavior was scored if the shoelaces were tied, the shoes were around the child's heel, and the no clothing extended beyond the heel of their shoe. 6) Sat down – This behavior was scored if the child's bottom or back came into contact with escalator steps. 7) Walked or ran in the direction of the Escalator – This behavior was scored if the child walked or ran in the direction the escalator was moving. 8) Walked or ran against the direction of the escalator – This behavior was scored if the child walked or ran against the direction the escalator was moving. 9) Stepped off the escalator carefully – This behavior was scored if the child was looking ahead, stepped off (no running or jumping), and was balanced while stepping off the escalator.

The percentage of children violating each safety rule was calculated for each session for each of the measures by dividing the number of children that violated each rule per session by

the number of children observed during that session. Calculating the number of persons following each separate rule before and after the program was implemented allowed for a comparison of the relative efficacy of the program in changing each of the targeted safety behaviors.

Measurement of inter-observer agreement. Two observers independently scored each safety behavior during six recording sessions in each city per experimental condition. A measure of inter-observer agreement was computed by dividing the number of agreements on the non-occurrence of each target behavior by itself plus the number of disagreements.

Inter-observer agreement data. The percentage of agreement on the occurrence of each behavior in Tallahassee and Saint John is presented in Table 2. The high level of inter-observer agreement was maintained throughout the experiment.

Experimental Design

A multiple baseline across cities design was used in this experiment. Baseline data were collected on children's safety related behaviors while riding escalators in two cities prior to the implementation of the *Safe-T Rider* program to provide a benchmark against which to compare the effects of the treatment. Next the *Safe-T Rider* program was introduced in each grade kindergarten through 5 in the Tallahassee (during the week of December 1st of 2003), while the City of Saint John remained in the baseline condition. After the effects of the program had been evaluated in Tallahassee the program was introduced in the city of Saint John (during the week of January 19th). Data were not collected in city receiving the program during the week that the program was implemented.

Data Analysis

A two-sample Z test was used to test for the difference in proportions for each variable

between baseline and treatment conditions. These analyses were performed for each site and for the data from both sites pooled since it was assumed that both sites were independent of each other. The sample sizes were sufficiently large to justify the validity of the normal approximation for the pooled data, all of Tallahassee and all of the Saint John data with the exception of whether the shoes were fastened, and moving against the escalator.

Results

The before and after data on safety behaviors collected in the malls in the City of Tallahassee are presented in Figure 1. The letters NS appearing above a set of bars for a particular safety behavior indicates that there was not a significant change in safety behavior. Numbers appearing above the set of bars for a particular safety behavior indicate a significant result was obtained using a one-tail Z test for significance. A level of .001 indicates that this difference would be expected to occur by chance only 1 in a 1000 times. The pooled data for both sites is presented in Figure 1. These data show that the Safe T-Rider program produced a significant reduction in unsafe behavior for not stepping on carefully (a reduction of 41.5%), not facing forward (a 34.4% reduction), not standing clear of sides (a 24.9% reduction), walking with the escalator (a 37.3% reduction), walking against the escalator (a 38.2% reduction), and not stepping off carefully (a 37.3% reduction). The data for the City of Tallahassee show similar results as the pooled data, however statistically significant results were only obtained for not facing forward, not staying clear of sides, walking with the escalator, and stepping off carefully. The results obtained in the city of Saint John were also similar to the pooled results with significant reductions obtained for not stepping on carefully, not facing forward, not standing clear of sides, walking with the escalator, walking against the escalator, and not stepping off carefully.

The *Safe-T Rider* program did not produce significant reductions in the percentage of children not holding a hand or the rail, sitting down, or with untied shoes/wearing loose clothing, at either site. Although the introduction of the program did not produce a significant reduction in the percentage of children not stepping on carefully, or walking against the escalator in Tallahassee, changes in behavior were in the predicted direction. In general, the data obtained in both cities look very similar.

During the middle of January a survey was conducted of children in the target age range at the malls in Tallahassee where the data on escalator safety had been collected. The results of this survey indicated that 80% of the target public schools had consistently delivered the program. These data also indicated that an additional 20% of the children that visited the mall attended private programs that did receive the program. The results of the study also showed that 64% of the children could identify the program materials and said that they saw it in school, and 42% of the parents accompanying the children also confirmed they saw the materials.

Based on these estimates the actual effect of the treatment on those children who actually received the program is likely greater than those shown in Figure 2. If we assume that the children not receiving the program did not change their behavior on escalators we could multiply the changes observed by 36% to estimate the likely change in those children that received the program. The confidence interval for this change was 9% (using .05 level). Hence the actual correction lies between 27% and 45%.

Assuming the effect of the treatment would be enhanced by 36% if we only collected data on students who took the program the percentage reduction in the incidence of not facing forward would be 45%, the percentage reduction for not standing clear of the sides would be

31%, the percentage moving with the escalator would be reduced by 38% and the percentage not stepping off carefully would be reduced by 61%.

Discussion

The results of this study show that a program administered in the schools that includes parental involvement can produce relatively large changes in safety related behavior in the community. The Elevator Escalator Safety Foundation has disseminated the *Safe-T Rider* program to over 400,000 children per year in North America for the past 5 years, reaching over 3.5 million children over the past 10 years at no cost to the school systems.

It is important to note that the pattern of rule violation was relatively similar across two cities with considerably different demographics located 1000s of mile apart. The similarity of: 1) the incidence of rule violation by type of violation across the two cities, and 2) the sensitivity of the target behaviors to the intervention; show that these data likely would have a high generality across North America. Overall, there were significant changes in six out of nine safety behaviors measured in this study. Reducing the number of children that do not step on and off carefully, do not face forward, do not stand clear of sides, and do not walk with or against the escalator are all behaviors that should increase the safety of children riding escalators.

Three behaviors (holding rail or parents hand, shoes untied or loose clothing, and sitting on the escalator) did not show significant changes following the introduction of the *Safe-T Rider* program. Sitting occurred at very low levels in both cities during baseline and intervention conditions and was not a target of the *Safe-T Rider* program. Shoes untied or wearing loose clothing, which also occurred, at relatively low levels showed a small non-significant decline following the delivery of the program. Participants in this program could easily address one component of this behavior (shoes untied) at the mall. The other component (Eliminating the use

of loose clothing) would require a change in the dressing habits and wardrobe making it much more difficult target for change. Unfortunately data on this target were pooled by observers and hence could not be disaggregated. Holding the handrail or an adult hand also did not change at either site. This behavior occurred at a relatively high frequency. Observers noted that many children held the rail when stepping on or off the escalator but would let go for over two seconds in the middle of the ride. The use of the 2-second criteria may have inflated this measure and reduced the likelihood of detecting changes in this behavior.

The changes in behavior produced by the program are relatively impressive when one considers that the program was only administered within the schools, and that no mediating strategies were employed such as prompts or reminders located in the malls near the entrances to the escalators. It should also be noted that the effects of the program were sustained for a period of six weeks following program delivery in each city and that no trends were noted to suggest that the effects of the program were diminishing over this period of time.

The results of the mall surveys conducted at the end of the study also indicated that the program produced large effects even though not all the children in the targeted age range actually received the program. It is inevitable that some children would be ill when the program was delivered, that some teachers failed to deliver the program as prescribed, and that some children observed in malls attended private schools, which were not scheduled to receive the program. However, because the purpose of the study was to evaluate the community impact of the program the data that was uncorrected for program delivery is the best way to view the results. However, if one is concerned in improving the efficacy of the program, the corrected data provide a clearer picture of how well the program influences the behavior of those children who receive it.

Although the overall results of this study were relatively impressive, it should be noted that the data indicated that the program was more effective at changing some behaviors than others. Two behaviors that did not improve following the introduction of the program was the percentage of children holding their parents hand, the handrail, or both, and the percentage of children sitting down on the escalator (a relatively rare but risky behavior). The next revision of the program should focus on improving elements designed to change these target behaviors.

References

Poche, C, Yoder, P., & Miltenberger, R. (1988). Teaching self-protection skills to children using television techniques. *Journal of Applied Behavior Analysis*, **21**, 253-261

Authors Note

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Table 1

Hypothesis test for [control proportion] - [treatment proportion] = 0 versus >0

- Difference between sample proportions fractions and decimals (with 95% margin of error in brackets)

- Z test statistic and P-value (* normal approx may not be valid for small samples)

	Variable	Tallahassee	Saint John	Pooled
1	steps on carefully	68/840 - 36/583 .081 - .062 = .019 Z = 1.37 P = .086	41/831 - 12/667 .049 - .018 = .031 Z = 3.26 P = .001	109/1671 - 48/1250 .065 - .038 = .027 (.016) Z = 3.18 P = .001
2	Held hand or rail	223/840 - 163/583 .265 - .280 = -.014 Z = -0.59 P = .722	127/831 - 96/667 .153 - .144 = .009 Z = 0.48 P = .315	350/1671 - 259/1250 .209 - .207 = .002 Z = 0.15 P = .441
3	Face forward	239/840 - 111/583 .284 - .190 = .094 Z = 4.05 P = .000	184/831 - 96/667 .221 - .144 = .077 Z = 3.82 P = .000	423/1671 - 207/1250 .253 - .166 = .088 (.029) Z = 5.69 P = .000
4	clear of side	235/840 - 126/583 .280 - .216 = .064 Z = 2.71 P = .003	174/831 - 104/667 .209 - .156 = .053 Z = 2.65 P = .004	409/1671 - 230/1250 .245 - .184 = .061 (.030) Z = 3.93 P = .000
5	shoes fastened and no loose clothes	70/840 - 44/583 .083 - .075 = .008 Z = 0.54 P = .296	1/831 - 0/667 .001 - .000 = .001 Z = 0.90 P = .185*	71/1671 - 44/1250 .042 - .035 = .007 Z = 1.00 P = .316
6	sat down	7/840 - 5/583 .0083 - .0086 = -.0003 Z = -0.05 P = .520	6/831 - 5/667 .0072 - .0075 = -.0003 Z = -0.06 P = .525	13/1671 - 10/1250 .0078 - .0080 = -.0002 Z = -0.07 P = .527
7	moving with escalator	266/840 - 134/583 .317 - .230 = .087 Z = 3.58 P = .000	339/831 - 150/667 .408 - .225 = .183 Z = 7.51 P = .000	605/1671 - 284/1250 .362 - .227 = .135 (.033) Z = 7.84 P = .000
8	moving against escalator	65/840 - 39/583 .077 - .067 = .010 Z = 0.75 P = .227	27/831 - 3/667 .032 - .004 = .028 Z = 3.84 P = .000*	92/1671 - 42/1250 .055 - .034 = .021 (.015) Z = 2.74 P = .003
9	steps off carefully	146/840 - 56/583 .174 - .096 = .078 Z = 4.13 P = .000	163/831 - 89/667 .196 - .133 = .063 Z = 3.23 P = .001	309/1671 - 145/1250 .185 - .116 = .069 (.026) Z = 5.09 P = .000

Table 2

The mean level of inter-observer agreement and respective ranges for each of the target behaviors in the cities of Tallahassee and Saint John is presented in this table.

Tallahassee						
Behavior	Does not step off carefully	Does not hold hand or handrail	Does not face forward	Does not stand clear of sides	Shoes unfastened or loose clothes	Did not stand up
% Agreement occurrence	100	96	90	84	91	100
% Agreement non-occurrence	100	89	96	91	99	100
Behavior	Does not stand in place (moves with escalator)	Does not stand in place (moves against escalator)	Does not step off carefully			
% Agreement occurrence	94	100	81			
% Agreement non-occurrence	98	100	97			
Saint John						
Behavior	Does not step off carefully	Does not hold hand or handrail	Does not face forward	Does not stand clear of sides	Shoes unfastened or loose clothes	Did not stand up
% Agreement occurrence	71	93	80	83	Did not occur	Did not occur
% Agreement non-occurrence	99	92	99	97	100	100
Behavior	Does not stand in place (moves with escalator)	Does not stand in place (moves against escalator)	Does not step off carefully			
% Agreement occurrence	80	67	71			
% Agreement non-occurrence	98	98	98			

Figure Captions

Figure 1. The percentage of children violating each safety rule during the baseline and treatment conditions across both cities.

Figure 2. The percentage of children violating each safety rule in the city of Tallahassee, Florida across baseline and treatment conditions.

Figure 3. The percentage of children violating each safety rule in the city of Saint John, New Brunswick during the baseline and treatment condition.

Figure 1.

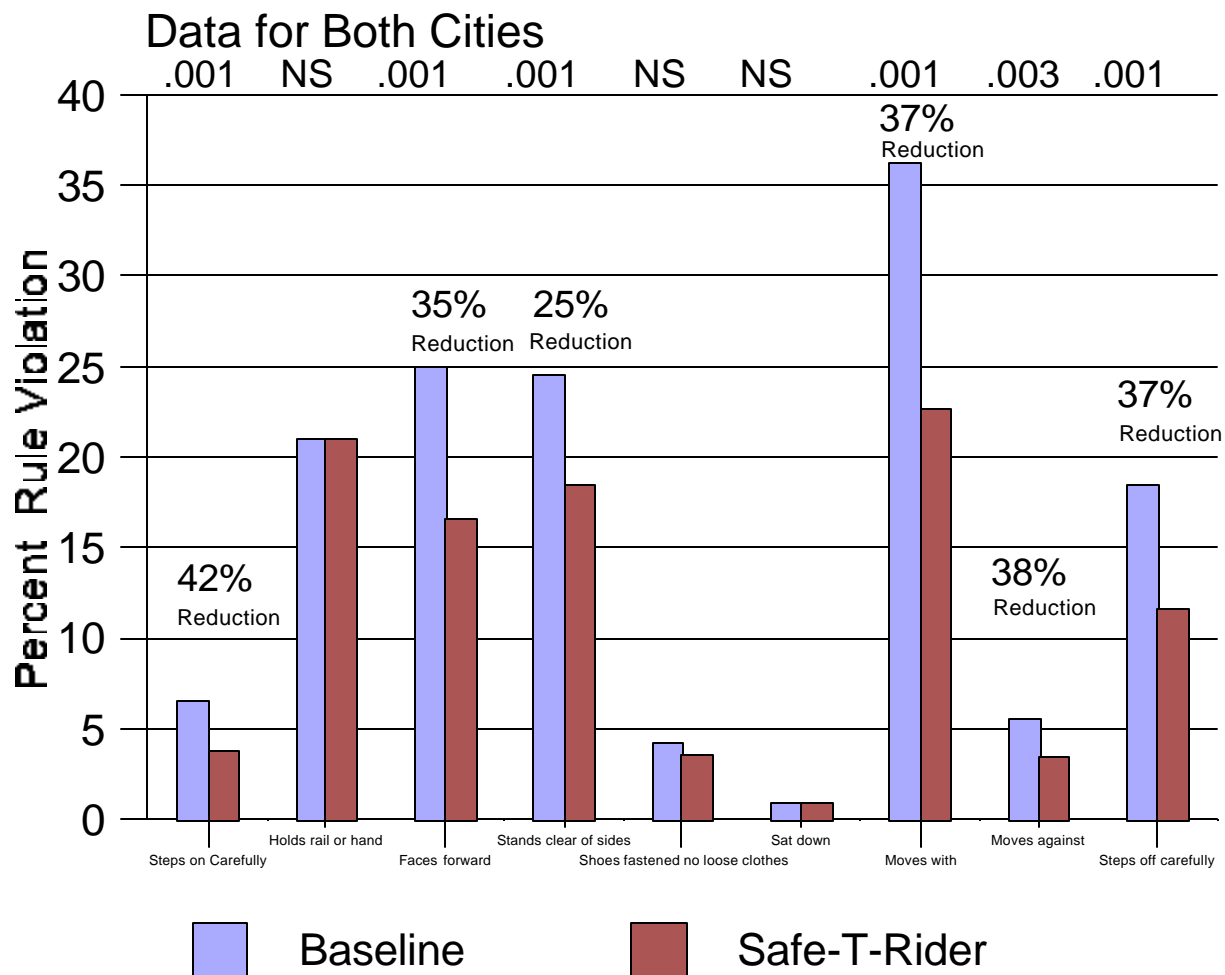


Figure 2

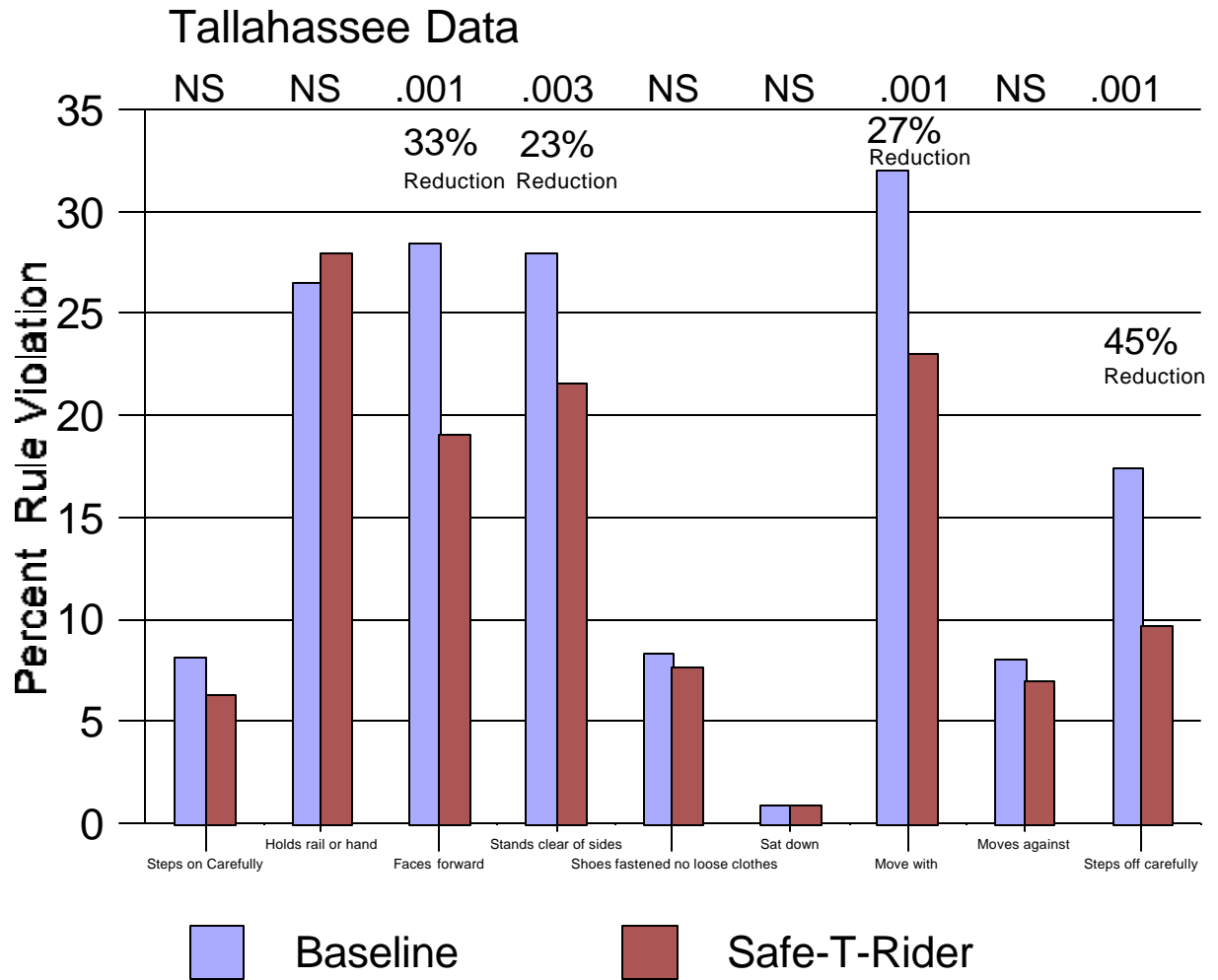


Figure 3

