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## RESEARCH LETTER

# Evaluation of the THINK FIRST For KIDS injury prevention curriculum for primary students

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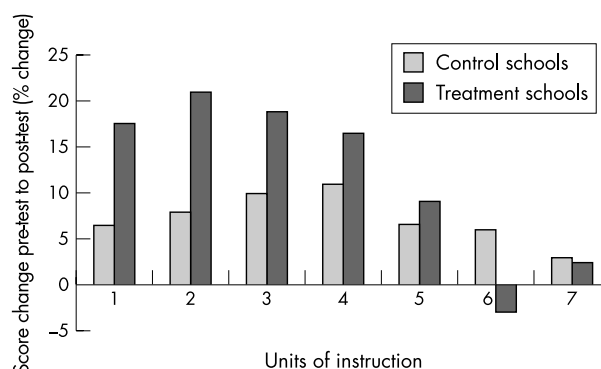
THINK FIRST is a national non-profit organization whose mission is to educate young people about the prevention of brain and spinal cord injuries. This paper describes a study conducted by THINK FIRST of Oregon on one of its injury prevention curricula, THINK FIRST for KIDS.

The THINK FIRST Program was founded in 1986 by the American Association of Neurological Surgeons and the Congress of Neurological Surgeons in response to the high incidence of traumatic brain and spinal cord injuries and subsequent disabilities among persons 10–24 years of age. Currently, there are THINK FIRST chapters in more than 40 US states, and in Canada, Chile, Australia, and Mexico providing injury prevention education to more than one million elementary, middle, and high school students each year. One of THINK FIRST's programs, THINK FIRST for KIDS, is organized into six safe behavior units taught over a six week period. The safe behavior units are integrated into teachers' regular math, science, reading, spelling, and health curricula. The six units cover the following:

- (1) General structure and function of the brain and spinal cord.
- (2) Motor vehicle and pedestrian safety.
- (3) Bicycle safety.
- (4) Conflict resolution and weapons' safety.
- (5) Water safety.
- (6) Playground, recreation, and sports safety.

THINK FIRST designed a curriculum to enhance children's interest in, learning about, and acceptance of safety messages. The curriculum is based on applied learning and behavioral theories, which suggest that varied messages introduced over time increase understanding, knowledge retention, and sustained behavior. Indeed, studies have shown that school based health education programs which start early and continue through several grades result in significant and sustained effects on health knowledge, attitudes, and practice.<sup>1</sup>

A three phase, non-random experimental study developed and tested a measurement instrument, and evaluated the efficacy of the THINK FIRST for KIDS curriculum in grades 1–3. The short term effects of this school based, teacher delivered, six week, six subject curriculum on student knowledge were measured by comparing pre-test and post-test scores in control and treatment schools. The results indicate a significant increase ( $p < 0.01$ ) in knowledge of injury prevention in all three grades at the treatment schools in comparison to the control schools. Treatment schools with a lower socioeconomic rank showed a greater increase in knowledge than higher ranked schools in both grade 2 ( $p = 0.0016$ ) and grade 3 ( $p = 0.0066$ ). The results of this study demonstrate that school based injury prevention efforts in early education may have a public health impact.



**Figure 1** Phase II pilot study: percent change from pre-test and post-test scores in units of instruction in control and treatment schools. Numbers 1–7 refer to unit topics: 1. motor vehicle/pedestrian safety; 2. water safety; 3. bike safety; 4. brain/spinal cord safety; 5. conflict/weapon safety; 6. playground/sports safety; and 7. bike safety behavior.

In phase I of the study, a cross disciplinary team, consisting of THINK FIRST staff, a clinical psychologist, a health and curriculum specialist, and an elementary school teacher, created a testing instrument for measuring student comprehension of the concepts presented in the THINK FIRST for KIDS curriculum (ages 6–8; grade levels 1–3; 1995). Test questions were designed to measure the effectiveness of the curriculum, and therefore were all knowledge based, except for the inclusion of three self reported behavior questions on bicycle helmet use. The test was administered to 870 students in five schools, where it functioned as the pre-test for both the experimental and control schools of the phase II study.

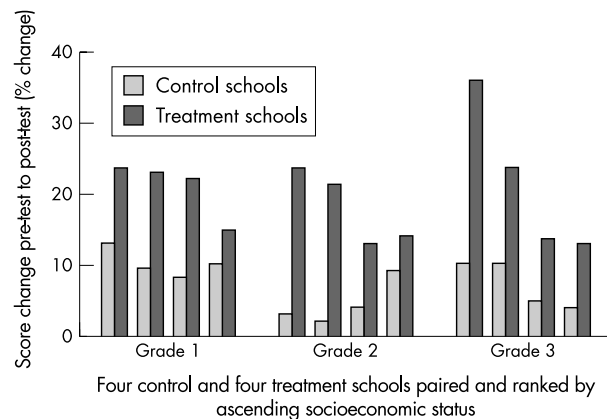
A pilot study was conducted in phase II to assess the measurement instrument's discriminatory ability in detecting differences between the treatment and control students, and to test the implementation process while initially measuring effectiveness of the THINK FIRST for KIDS curriculum (1995–96). There were 22 classrooms ( $n = 550$  students) in three schools in the treatment group, and 12 classrooms ( $n = 320$  students) in two schools in the control group. Assessments of individual units for all grade levels showed a significant improvement in several of the units of instruction (see fig 1). Scores actually decreased in the sports and playground unit. There were no significant changes in self reported behavior regarding bike helmet use; however, pre-test scores showed that 95% of all students reported they had access to a bicycle helmet, and 75%–90% of all students reported that they "always" wore their bike helmets.

The purpose of phase III was to conduct a large scale evaluation to measure the effectiveness of the THINK FIRST for KIDS curriculum overall (1996–97). All test items for the pre-test and post-test were scored as the percentage of correct answers given by each classroom ( $n = 64$  classrooms,  $n = 1400$  students). Test items were subgrouped by grade, by

**Table 1** Mean score difference from pre-test to post-test for control and treatment schools in phase III

Unit	Grade 1			Grade 2			Grade 3		
	Control	Treatment	p Value (No of test items)	Control	Treatment	p Value (No of test items)	Control	Treatment	p Value (No of test items)
Overall	8.6	19.5	0.0002 (15)	3.7	16.8	0.0001 (16)	5.9	22.2	0.0011 (19)
Brain and spinal cord	2.2	20.5	0.0003 (3)	0.4	14.0	0.0037 (3)	9.8	29.1	0.0001 (5)
Water safety	8.9	27.6	0.0008 (3)	4.6	26.8	0.0001 (3)	1.3	14.1	0.0489 (5)
Bike safety	7.1	13.4	0.07 (3)	7.9	12.8	NS (3)	5.2	23.8	0.02 (3)
MV/pedestrian safety	21.2	27.7	NS (3)	-2.3	8.3	0.0143 (5)	7.2	25.3	0.0134 (3)
Playground/sports safety	9.2	10.7	NS (2)						
Conflict/weapons safety	5.8	7.9	NS (1)	6.0	5.5	NS (2)	6.8	19.0	0.0237 (3)

The test instrument was administered one week before and one week after the six week teaching period in 33 classrooms (n=735 students) in four schools in the treatment group and in 31 classrooms (n=665 students) in four schools in the control group. The mean score difference is the mean post-test score minus the pre-test (baseline) score. MV, motor vehicle.



**Figure 2** Percent change from pre-test and post-test scores of control and treatment schools paired and ranked by ascending socioeconomic status.

socioeconomic status matched treatment and control schools, and/or into the six areas of instruction. An initial analysis of baseline (pre-test) scores, by grade, was performed to determine any differences in knowledge level between control and treatment schools at the beginning of the study. Overall, there were no significant differences in pre-test scores between control and treatment schools for any of the three grades. However, after the six week curriculum study, the overall mean scores for the treatment schools increased significantly compared with the control schools for grade 1 ( $p=0.0002$ ), grade 2 ( $p=0.0001$ ), and grade 3 ( $p=0.0011$ ) (see table 1). Mean score differences (from pre-test to post-test) for treatment schools were 2.3-fold, 4.5-fold, and 3.7-fold greater than for control schools for grade 1, grade 2, and grade 3, respectively.

The results from this study indicate that the six week THINK FIRST for KIDS curriculum significantly increased knowledge for students in grades 1, 2, and 3 overall and within most of the individual units. The findings also show a significant correlation between socioeconomic status and score

improvement, with the greater effect on scores associated with the lower socioeconomic status schools (see fig 2). This study, though not intended to measure long term knowledge, beliefs, or observed behavior, did provide education and create awareness, which are both necessary and effective first steps in the prevention of injury.<sup>2,3</sup> Moreover, the study has underscored the importance of early intervention. The rationale for targeting younger children stems from evidence that reaching youth at an early age may decrease risk-taking behavior later when they are older adolescents.<sup>1</sup>

This study shows that the THINK FIRST for KIDS injury prevention curriculum leads to a significant change in knowledge about the prevention of brain and spinal cord injuries among first, second, and third grade students. The curriculum incorporates components necessary to promote positive behaviors in young children and, given the Think First Foundation's national delivery system, has the potential to effectively reach over one million children annually.<sup>4</sup> However, it is recognized that strengthening individual knowledge and skills is only a first step in injury prevention efforts. Future studies should therefore measure any long term effects on student knowledge and behavior, increases in educators' knowledge, and effects on school based injury prevention policies.

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