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EMPIRICALLY DERIVED INJURY PREVENTION RULES

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This study describes a set of empirically derived safety rules that if followed, would have prevented the occurrence of minor injuries. Epidemiologists have criticized behavioral interventions as increasing "safe" behavior but failing to demonstrate a decrease in injury. The present study documents retrospectively the link between safe behavior and injury. It demonstrates that these empirically derived rules are very similar to rules for the prevention of serious injury. The study also shows that these rules are not widely accepted and implemented by parents. Suggestions for future research in this area are advanced.

DESCRIPTORS: injury prevention, safety skills, children, behavioral pediatrics

Injuries are the leading cause of death in children in the United States; every year 30,000 children suffer permanent disabilities, 600,000 children are hospitalized, and 16 million children receive medical care in emergency rooms because of nonintentional injury (Rodriguez, 1990). However, research on preventing injuries is fairly recent; behavioral interventions in this area began less than 15 years ago. One of the primary contributions to injury prevention made by behavioral scientists has been the demonstration that children can be taught to respond safely to various emergency and everyday situations.

For example, Jones (1980) and his colleagues (Jones & Haney, 1984; Jones, Kazdin, & Haney, 1981) have taught children emergency fire-exiting skills. Jones and Kazdin (1980) and Rosenbaum, Creedon, and Drabman (1981) used modeling, rehearsal, and reinforcement to teach children to discriminate emergency situations. Similarly, Poche, Brouwer, and Swearingen (1981) developed a program that successfully taught children to avoid a potential abductor. These projects have conclusively shown that children can be taught, through the use of behavioral techniques, to respond appropriately when presented with a clear threat.

However, the bulk of injury prevention must occur in situations in which the threat to the child is embedded within the natural environment, with which the child must interact. Such situations demand that the child be able to discriminate the embedded threat and correctly perform safe, rather than risky, behaviors, even when the threat of injury is not obvious and the probability of injury appears low. For example, Yeaton and Bailey (1978) focused on street-crossing skills for children in early elementary school. Children were taught to discriminate when to wait, when to leave the curb, and how to cross (e.g., constant looking, no running). Similarly, Peterson and her colleagues (Peterson, 1984a, 1984b; Peterson & Mori, 1985) have focused on teaching children who are unsupervised in the home several kinds of safety skills, including safe food preparation, selection of activities, and methods of self-care (e.g., drying off safely after coming in from a rainstorm). These studies have taught safe alternatives to more typical risky behaviors, rather than simply hazard avoidance.

All behavioral programs to date have demonstrated their effectiveness by showing an increase in safety skills rather than a decrease in injuries. Even though injuries are the leading killer of children, they remain relatively infrequent in the overall population. Many thousands of children would need to receive safety instruction before a decrease in

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injuries would be apparent. The link between increased safety skills and decreased injury has been presumed by behavioral preventionists but never actually demonstrated. This inferential link is one of the weaknesses of behavioral methods, according to epidemiologists who continue to view educational methods as relatively ineffective (e.g., Rivara & Mueller, 1987). Therefore, it would be useful to establish an empirical link between safer behavior and decreased injury rates.

The present study achieved such an initial link, by examining in detail the etiologies of actual minor injuries and then empirically deriving from these data a set of safety recommendations that would have prevented these injuries, where possible. Thus, this study reports on the first set of safety rules derived from actual child injuries and considers how many of these minor injuries could have been prevented by safer behaviors. In combination with interventions to decrease environmental hazards (Rivara & Mueller, 1987) and focused behavioral interventions to deal with known high-risk responses (e.g., Yeaton & Bailey, 1978), these rules may add to the existing effective prevention methods for children's injuries.

One of the hallmarks of behavioral research is the use of behavioral observation as the method for obtaining the primary dependent variable. However, low-rate events such as injuries make data collection from a trained external observer impossible. However, the use of recorded parental observations has been regarded by many experts as an acceptable source of behavioral data (e.g., Chamberlain & Reid, 1987; Forehand & McMahon, 1981; Patterson, 1982; Wahler, House, & Stambaugh, 1976). In this study, we taught observation skills to both parent and child participants and used their recorded observations as the basis for a detailed, interview-elicited report of injury events.

METHOD

Subjects

Second-grade children were selected because they were able to complete the self-monitoring forms and structured interview used in the study, and they were the youngest children who could legally be left unsupervised in this state (Masters, 1978), thus allowing parents to discuss the child's supervision level freely.

From a list of all second graders in the local school district, children were randomly selected. The female guardian of each selected child received a letter describing the project and a subsequent telephone call to determine willingness and eligibility to participate.

Because of the intensive and expensive task of training mothers and children as participant observers, the sample size was restricted to 66 families. Given the limited sample, it was important to obtain a homogeneous group of children and avoid a sample that might contain a small number of children with special risk factors. Thus, children were ruled out if they had been diagnosed with a learning disability, mental retardation, a behavioral disorder, or a physical disability (other than eyeglasses); if their immediate family had recently moved or intended to move, would be unable to complete all scheduled 2-week interviews, had a history of an overnight hospitalization due to injury in the last 5 years, or did not have the child in residence 12 of every 14 days; or if either the child or mother did not speak English. Of the eligible children, 63% agreed to participate with their female guardians. Thus, 33 girls and 33 boys and their mothers gave written consent and began the project, and 30 girls and 31 boys and their mothers completed all 22 interviews. Subjects received $1 per day of participation.

The demographics of the sample mirrored the local population, with slightly fewer ethnic minorities (population is 93% white and 7% minority; present sample is 97% white and 3% minority) and a wide range of socioeconomic status represented, with the slight majority being middle-class participants (Hollingshead & Redlich, 1958, two-factor index indicated 8% of the families were Class I, 50% were Class II, 22% were Class III, 17% were Class IV, and 3% were Class V). Duncan's revised socioeconomic index (Hauser & Featherman, 1977) ranged from 7.1 to 92.1, with a mean of 54.8.

Interviewers

Six graduate assistants, who were unfamiliar with the injury prevention literature and any specific hypotheses, participated as interviewers. The one man and five women were each assigned responsibility for the same group of 10 or 11 families throughout the project. The interviewers received several weeks of training to produce an open-ended, nonleading interview concerning injury events.

Coders

Two undergraduate coders transferred the descriptions of the injury event to injury prevention categories, and three undergraduates coded the degree to which the injuries could have been serious. These individuals were unfamiliar with the injury prevention literature or any experimental hypotheses.

Procedure

Children and mothers were individually trained as participant observers. They were taught through modeling and rehearsal to record each minor injury as soon after the event as possible. Anonymous debriefing at the end of the yearlong project indicated that they recorded the details of each injury for the majority of events. Every 2 weeks, the interviewer assigned to the family interviewed the mother and the child separately, asking about each of 29 different injury categories designed to provoke recollection of any injuries that had occurred.

When through either the self-monitoring sheets or interviewer queries, mothers or children recalled an injury, the interviewer asked the subject to think clearly about the event from before it happened to after it was over. The subject was asked to "see it like a movie in your mind" and then to report on the event, to allow the interviewer to picture what happened before, during, and after the event.

In this manner, the antecedents, the event itself, and the consequences to the event were recorded in standardized form. Over two dozen standardized follow-up questions insured that all of the relevant aspects of the injury event were recorded. We trained both the child and the mother as participant observers and repeatedly assessed the quality of their data through (a) in-home and in-laboratory simulations of injuries (where the observation reported could be checked with the actual event), (b) test–retest reliability by different interviewers, and (c) comparison of the mother's and child's observations of the same event. These assessments strongly supported the reliability and validity of the dependent variables used in this study (for details, see Peterson, Brown, et al., 1993). Extensive injury simulation, reinterviewing, and participant correspondence testing suggested that the recall and reporting of the injuries were accurate and complete for the primary dependent variables.

Measures

Injuries. Injury events made up the central measure of interest. An injury event was defined as a discrete event that had associated tissue damage (as demonstrated by either a bruise, cut, raised bump, or pain lasting more than 15 min). Thus, injuries occurring incrementally over time (e.g., blisters or sore muscles) or at an unknown time (e.g., poison ivy or sunburn) were not included in the present report.

Except for participant observers' recollections, there were no data on the actual number of injuries that occurred. However, examination of the matrix of injuries recalled by both children and mothers (n = 776), by the children but not the mothers (n = 290), and by the mothers but not the children (n = 249) suggested that the final cell (not reported by mothers or children) should be fairly small. That is, of the total number of injuries recalled by the mothers, more than two thirds were recalled by the children and vice versa. There was a smaller number recalled by only one of the participant observer pair. The number of the third kind of injuries, those forgotten by both observers, should be even smaller, given that remembering is of higher probability than forgetting in the present data set. A reader might argue that certain kinds of injuries might be particularly likely to be forgotten. The rejoinder to this suggestion is that such injuries must differ from the type of injuries reported here and would therefore not be a part of this data set, which represents only those injuries of the kind reported by the participant observers in this study. Children reported that mothers were aware of 92% of the

injuries the children reported, so the difference in reporting is only partially explained by children being aware of some injuries never revealed to the mother. Debriefing concerning adherence to the participant observer training suggested that the present data set is a good representation of the injuries that occurred to these children during the year of the study.

Prevention rules. The prevention rules were empirically derived from the open-ended descriptions of the mothers and children. The team of coders read all (over 2,000) injury reports, and after reading each one they ascertained whether the event was preventable and independently wrote potential rules describing how such an event could reasonably have been prevented. Then the team met in group to discuss the empirically generated rules. There was a strong emphasis in rule creation on what was reasonable to expect of 8-year-old children and their mothers. Rules that were very general (e.g., "pay attention to your surroundings") and restrictive (e.g., "do not ride a bicycle") could prevent the large majority of injuries, but were not included. In practice, such rules would be relatively useless, because they are impossible to implement. Ultimately, two sets of reasonable rules were devised. The larger set consisted of the 59 rules that are shown in Table 1; these rules were viewed as rules likely to be accepted by most parents as not unduly restrictive. A smaller set of 18 slightly more restrictive rules was also devised and is shown in Table 2.

After each list had been finalized and examples that did and did not apply to each rule had been discussed, coders received intensive training and feedback on their coding accuracy. Then, they coded all of the injury events according to the lists of rules. Each event was coded 0 (no rule applies to this event) or received a nonrestrictive or minimally restrictive rule assignment. After training, coders independently rated all events, overlapping on 10% of them. The overall exact agreement on the restrictivenesss of each rule (or whether no rule applied) was 87%. More conservative reliability, which examined no correspondence as a single separate category, revealed that coding was acceptable for both nonrestrictive (K = .83) and minimally restrictive (K = .60) rules.

Potential severity. A separate team of coders rated each injury event in terms of the likelihood of the injury resulting in permanent disability or death. The rating reflected what logically might have occurred with each unique integration of child behavior and environment. This was accomplished using a 3-point scale, with a rating of 1 indicating that serious injury was highly unlikely (would occur from never to 1 chance in 1,000), 2 indicating a low likelihood of serious injury (1 chance in 1,000 to 1 chance in 100), and 3 indicating a possibility for serious injury (from 1 in 100 to virtual certainty). This measure is described in more detail elsewhere (Peterson, Cook, Little, & Schick, 1991); it was thought to provide a somewhat crude estimate of whether the event should be regarded as trivial or as potentially similar to a major injury. It was coded accurately (r = .80) and was very stable when a second interview assessed test–retest reliability for each family (r = 1.0).

Parent permission. After mothers had described each injury, they were asked on a 1 (perfectly okay) to 5 (absolutely not allowed) Likert-type scale whether the activity in which the child had been engaged at the time of the injury was permitted in their family.

RESULTS AND DISCUSSION

Tables 1 and 2 indicate the frequency of child- and mother-reported events that could have been prevented by the nonrestrictive and minimally restrictive rules, those injuries that would have been prevented that were rated by mothers as being against family rules, and those injuries that would have been prevented that were rated as having a moderate or high potential for serious injury (moderate and high were collapsed because fewer than 7% of the injuries were evaluated as having a high likelihood of serious or fatal injury). The rules prevented a sizable minority of these injuries (31% of those reported by mothers and 31% of those reported by children). About two thirds (227 for mothers and 268 for children) of the 325 preventable injuries reported by mothers and the 379 preventable injuries reported by children could have

Table 1

List of Nonrestrictive Injury Prevention Rules, with Frequency of Injuries That Would Have Been Prevented: Total Injuries for Children and Mothers, Injuries That Were Against Family Rules, and Injuries That Had Moderate or High Potential Severity

Prevention rules	Frequency of injuries prevented			
	All by children	All by mothers	Against rules[a]	Potentially serious[b]
A. Walking (Walking rules also apply to running.)				
1. Don't walk backwards.	4	5	1	4
2. Don't walk barefoot outside.	17	17	0	4
3. Don't wear cleats on hard surfaces (e.g., wood, cement).	2	0	0	0
4. Don't walk in the dark.	2	2	0	0
5. Don't walk through a construction area.	1	0	0	0
B. Running				
1. Don't run on stairs.	12	11	0	9
2. Don't run indoors except in designated areas (gymnasium).	26	23	10	12
3. Don't run when wet (in or out of doors) or when on any icy surface.	10	7	0	6
4. Don't run with anything in your mouth.	1	1	1	1
5. Don't run in a parking lot or street.	1	1	0	1
C. Riding a bike				
1. Don't carry anything while riding your bike that has to be balanced. Carry items only in a basket.	3	1	0	1
2. Don't ride in rain or on a wet surface.	4	1	0	0
3. Don't ride within 6 ft of another rider.	1	1	0	1
4. Wear protective equipment.	0	0	0	0
5. Only one rider per bike, skateboard, or scooter.	5	5	0	4
6. Always have both feet on the pedals and use both hands when riding a bicycle.	3	3	0	2
7. Ensure all equipment is functioning properly before riding.	0	0	0	0
8. Don't ride bike, skateboard, or scooter indoors.	1	1	0	0
9. Don't pull anything with a bike or scooter.	2	1	0	1
D. Riding in or on a vehicle				
1. Don't sit anywhere in car except on the seat.	1	1	0	0
2. Enter and exit vehicle only through the door.	1	1	1	1
3. Keep all body parts inside moving vehicle at all times.	1	0	0	0
4. Don't play on or with motorized vehicles.	0	3	0	2
5. Don't stand on seats, always sit properly, with seatbelt if riding in any vehicle with parent's permission.	1	0	0	0
E. Swimming				
1. Don't dive in shallow water.	2	1	0	1
F. Other outdoor children's activities				
1. Use playground equipment only in the intended fashion, especially do not go up slides, facing out when going down ladders, balance on structures more than 1 ft above the ground, etc.	15	9	0	3
2. Wear the suggested protective equipment when playing sports.	4	2	0	0
3. Wear correctly fitting clothing, appropriate to the activity, with all laces fastened.	9	4	0	2
4. Play ball or running games only in open areas where there are no people, equipment, or vehicles with which to collide.	17	10	0	7

Table 1
(*Continued*)

Prevention rules	Frequency of injuries prevented			
	All by children	All by mothers	Against rules[a]	Potentially serious[b]
5. Don't use playground equipment under adverse conditions (e.g., in the rain or snow).	3	2	0	1
6. When not using playground equipment, stay clear of it.	3	1	0	1
7. Sled only in areas clear of obstructions.	0	1	0	0
8. Don't use B.B. guns.	1	0	0	0
G. Climbing a height				
1. Don't climb higher or jump from anything that's higher than your shoulders, unless it is a climbing apparatus meant for climbing.	9	9	2	4
2. Use stepping stools and ladders for reaching high places. When using, carefully distribute your weight in the center. Do not overreach.	4	7	3	4
3. Don't play or fight on stairs.	4	4	0	2
H. Screwing around				
1. Don't hit, tease, kick, scratch, trip, bite, or grab objects from another.	11	4	1	1
2. Don't throw things in any enclosed area (e.g., in the house, or on a bus).	4	7	1	0
3. Use furniture appropriately (e.g., don't jump on or hang upside-down on furniture).	13	11	6	7
4. No horseplay in any moving vehicle.	2	2	0	0
5. Don't poke, pull fur, or take food objects away from or corner an animal.	12	9	5	6
I. Ingestion of substances				
1. Don't chew nonfood objects.	1	0	0	0
2. Don't taste, touch, or smell medicines or cleaners.	6	0	0	0
3. Ensure substance is cool enough before ingestion.	0	2	1	0
J. Heat				
1. Be cautious of hot objects (anything that comes directly from oven, heatlamps, or appliances).	12	14	1	0
2. Don't stick your finger (or other parts of body) in hot water; use only warm or cold tap water.	1	0	0	0
K. Appliances				
1. Stay away from electrical doors or windows.	1	1	1	1
2. Don't come within 3 ft of the stove while an adult is cooking.	1	2	1	1
3. Don't cook on top of the stove or in the oven.	3	6	0	1
4. Don't stick your finger in stapler.	1	1	0	0
L. Fire hazards				
1. Don't play with fire; don't put anything into a fire or take anything out.	1	1	0	0
2. Don't touch fireworks.	2	3	0	0
M. Sharp objects				
1. Use sharp objects only for their intended purpose.	8	4	1	0
2. Avoid sharp wire on fences.	5	4	0	0
3. Whenever a glass or ceramic object is broken, alert an adult who can dispose of all the pieces appropriately.	2	2	0	0
4. Use utensils, not fingers, to extract materials from an open can.	2	2	1	0

Table 1
(*Continued*)

Prevention rules	Frequency of injuries prevented			
	All by children	All by mothers	Against rules[a]	Potentially serious[b]
N. In the gym				
1. Do not use weight-lifting equipment uninstructed or unsupervised.	1	2	1	1
2. Do gymnastics or wrestle only on a padded surface (or soft grass) with at least 6 ft of clearance on all sides.	8	14	1	7
3. Allow others doing gymnastics or wrestling at least 6 ft of clearance for their activities.	1	1	1	0

[a] Those injuries that mothers rated as against family safety rules (i.e., rated either a 4 or 5 on a scale of 1 = perfectly okay to 5 = absolutely not allowed).

[b] Those injuries reported by mothers that were rated either a 2 (moderate probability of serious injury) or 3 (high probability of serious injury).

been prevented by the nonrestrictive rules, and the other third (98 for mothers, 111 for children) could have been prevented by the minimally restrictive rules. A little less than half of the preventable injuries were judged to be of moderate or high potential severity (99 of the 227 prevented by nonrestrictive rules and 44 of the 98 prevented by minimally restrictive rules).

As can be seen in the tables, with one exception (minimally restrictive Rule 11 for mothers) there was no single rule that accounted for preventing more than two dozen injuries. Many (around 50%) of the empirically derived rules would prevent only one or two injuries, and thus could be eliminated with little cost to the system in order to make a smaller, more easily implemented set of rules. The most effective of the nonrestrictive rules pertain to limiting activity to the appropriate location (e.g., do not run indoors or on ice, play ball or running games only in appropriate areas) or on appropriate equipment (e.g., use playground equipment appropriately, do not climb on things not made for climbing, don't jump or hang upside down on furniture).

The minimally restrictive rules that would prevent the largest number of injuries outlawed aggressive behavior. Other minimally restrictive rules that would have prevented approximately a dozen injuries reported by mothers and children included avoiding playing with tree branches, sharp objects, or in doorways. Wearing shoes outside (not restrictive) and indoors (minimally restrictive) would also have effectively prevented several injuries.

Most of these rules do not resemble the rules used in most behavioral safety training, which has focused on specific hazards (e.g., sharp knives, appliances, heat sources, water), but rather are reminiscent of the sort of "safety nagging" often emanating from supervising parents ("You put on shoes before you go out," "Don't climb on that, you'll get hurt," "No roughhousing in the living room!"). At minimum, these rules may give some credence to such reminders by establishing that these rules can actually prevent children's injuries. They also suggest that teaching life-style safety habits rather than simple hazard avoidance may be more successful.

However, for the most part, the parent ratings of the permissibility of the behavior that resulted in injury did not correspond to the injury prevention rules. That is, of the 325 injuries that could have been prevented had the child behaved safely, parents rated 58% of the behaviors as a 1 on the 1 (perfectly okay) to 5 (absolutely not allowed) scale. They indicated 13% as 2, 10% as 3, and only 8% and 11% as relatively not allowed (4 and 5, respectively). Tables 1 and 2 show the number of preventable injuries that resulted from behaviors the parent suggested were not allowed. This number was never a majority in any of the categories with a substantial number of injuries. Thus, it is clear that for the most part, parents did not use

Table 2

List of Minimally Restrictive Injury Prevention Rules, with Frequency of Total Injuries That Would Have Been Prevented for Children and Mothers, Injuries That Were Against Family Rules, and Injuries That Had Moderate or High Potential Severity

Prevention rules	Frequency of injuries prevented			
	Mothers	Children	Against rules[a]	Potentially serious[b]
1. When using spray or aerosol can, ensure contents in container are emitted in opposite direction.	1	0	0	0
2. Wear shoes indoors.	9	12	0	2
3. Don't walk on slick surfaces when feet are wet.	1	0	0	1
4. Don't use anything hot enough to burn you (e.g., microwave, iron, curling iron).	3	4	0	1
5. Don't use anything sharp enough to cut you (e.g., knives, saws, can openers).	11	13	4	3
6. Don't play with doors or in doorways; always walk directly through doorways.	10	11	3	2
7. Don't strike, swing on, or bend back branches of trees.	8	11	3	6
8. Don't sit on toys inappropriate for size (baby toys).	0	1	0	1
9. Don't play aggressively with household objects (e.g., rulers used as weapons).	1	0	0	1
10. Don't shoot rubber bands or wrap them around fingers.	1	0	0	0
11. Don't horseplay, rough-house, pillow fight, or wrestle.	24	38	6	15
12. Don't walk, run, hop, skip, dance, or move in any way with eyes closed or covered, without supervision.	3	1	0	1
13. Don't do gymnastics without an adult spotter.	5	1	0	0
14. Use tools only with vigilant adult supervision.	1	3	0	3
15. Don't run holding onto objects or other people.	3	3	0	3
16. No playing physical contact games (e.g., red rover).	14	10	1	4
17. Don't use a slip and slide (water apparatus).	1	2	0	0
18. Don't rollerskate, skateboard, or ride your scooter on the street.	2	1	0	1

[a] Those injuries that mothers rated as against family safety rules (i.e., rated either a 4 or 5 on a scale of 1 = perfectly okay to 5 = absolutely not allowed).

[b] Those injuries reported by mothers that were rated either a 2 (moderate probability of serious injury) or 3 (high probability of serious injury).

the injury prevention framework that we empirically derived.

Because the rules were empirically derived from a list of minor injuries, some are specific to minor injuries and thus may be of less interest to parents and to injury researchers (e.g., few children will be seen in emergency rooms because they stuck their fingers in a stapler). However, the majority of the rules pertain to the prevention of both trivial and serious injuries. When compared with a recent epidemiological text on prevention of disability and death (Wilson, Baker, Teret, Shock, & Garbarino, 1991), each of the present rules appears to a greater or lesser extent in 15 of the book's 17 chapters on injury prevention (the exceptions are chapters on "Assaults" and "Suicide and Suicide Attempts" that were not part of the subject matter of this study). Thus, although there are many other rules not in this set because these children failed to perform the dangerous behaviors (e.g., playing in an elevator shaft or open window), the rules that are present are in line with the rules recommended by safety experts to prevent serious injury.

Before a reader examines the injury prevention rules, he or she might argue that because the rules are established retrospectively, it is unclear whether following them would actually have prevented the relevant injury. However, studying the rules should dispel this notion. Under these rules, had the prohibited behavior not occurred, the injury could not

have occurred (e.g., if the child had not been cooking on top of the stove, she could not have been burned; if the boy had not stuck his fingers into the can, he could not have been cut on the lid).

It is not the case, however, that merely adopting these rules will protect children from injury. The children need to learn the rules and any requisite skills necessary to abide by them, and the rules must be enforced by the parents. Past research has clearly documented that parents tend to overestimate children's knowledge of family injury-prevention rules (Peterson, Mori, & Scissors, 1986). Results from an extensive data set from the present subjects (reported in more detail elsewhere) substantiate that only about two thirds of the time do parents enforce the rules that, when broken, result in injury (Peterson, Bartelstone, Kern, & Gillies, in press). Furthermore, the only consequence for the overwhelming majority of these events is a lecture that is never recorded or recalled by the child. Thus, determining the most effective set of rules is only the first step toward establishing an effective safety regimen.

Some may find it disappointing that a larger proportion of injuries were not covered by these behavioral prevention rules. It is important to restate that there are other aspects of behavior that can prevent injury, notably paying attention to where one is going and what one is doing. However, it may be very difficult to teach increased vigilance as an ongoing response to one's environment, whereas it is possible to teach and enforce the rules outlined here. The idea that fully a third of "accidental" injuries can be readily prevented by using a set of commonsense rules should be a positive finding for those in the field of injury prevention, as well as for parents of children in the age group studied here.

Most injury prevention information has been directed toward parents of infants and toddlers, for whom barriers such as child gates can prevent falls and outlet covers and latches can prevent contact with electricity and harmful substances. Although these approaches are necessary and effective, older children cannot be protected as easily, and, with the exception of the few studies cited earlier on safety-skills acquisition in children, little research has offered concrete suggestions that deal with daily safety for parents of older children. The challenges in this arena have been best met by behavioral interventions. The present set of rules offers some initial validation of continued movement in this direction.

The present study is one of the first attempts to link safer behavior to the prevention of injury. These findings are limited to middle-income 8-year-old children without special risk factors. Future research with children who may be at special risk for injury (e.g., impulsive children; Hartsough & Lambert, 1985) and with children of different ages is necessary. It also remains for future research to validate the utility of these rules for actual implementation with children. Ongoing research that focuses on the behavioral analysis of more serious forms of injury (e.g., Christoffel et al., 1991) may allow additional understanding of the role of child behavior and parent rule making and enforcement. A complete articulation of the common antecedents and consequences to common childhood injuries might give behavioral researchers a firmer basis for the design of preventive interventions. Improving the effectiveness of preventive interventions, and thus reducing the leading threat to children's health in this country, is the ultimate goal of this descriptive research.

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