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Maternal and Child Reports of Behavioral Compensation in Response to Safety Equipment Usage

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Maternal and Child Reports of Behavioral Compensation in Response to Safety Equipment Usage

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Objective: To assess maternal and child risk compensation behaviors in response to several commonly used safety measures.

Methods: We administered a previously validated self-report measure of risk tolerance to a total of 151 mothers and their children in grades 3–7. Mothers indicated the level of risk they would permit their child to assume; children were questioned regarding the degree of physical risk they would typically assume while unsupervised by an adult. Participating families were randomly assigned to conditions in which safety equipment either was or was not present during assessments of risk tolerance.

Results: Mothers who viewed the stimulus materials depicting the use of safety precautions reported significantly higher levels of tolerance for risky behavior on the part of their children than did mothers who viewed identical materials without the safety precautions. No significant differences in estimated risk taking emerged between children in the two experimental conditions.

Conclusions: These data may reveal a compensatory mechanism by which parents escalate their threshold for acceptable risk behavior in the presence of safety precautions for their children. Such tendencies have the potential to offset some of the protection provided by the use of safety equipment.

Key words: risk behavior, risk taking, risk tolerance, safety measures

Unintentional injuries have supplanted illness as the major source of death and disability for youths over the age of one in the United States (Centers for Disease Control [CDC], 2000; Rice & Mackenzie, 1989; Rodriguez, 1990). In 1996 alone, 13,000 children died from unintentional injuries in this country (CDC, 2000). Furthermore, for every injury-related fatality, an estimated 233 additional children require emergency medical treatment for injuries (either unintentional or intentional) each year (Burt & Fingerhut, 1998). The financial consequences of these injuries are also disturbing. It has been reported, for instance, that 15% of all medical spending for children from ages 1 to 19 is directed toward treatment and rehabilitation following unintentional injuries (Miller, Romano, & Spicer, 2000). Clearly, the personal and economic impact of unintentional childhood injuries makes prevention of these unfortunate events an important societal issue.

Unfortunately, many of the activities that children most enjoy frequently lead to serious injury. Bicycling,

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a ubiquitous activity for many youths, is associated with 400 deaths and nearly 400,000 emergency room visits each year for children under the age of 15 (Wilson, Baker, Teret, Shock, & Garbarino, 1991). Water-related recreation results in over 2,000 child drownings annually, a figure exceeded only by the number of deaths involving automobiles (CDC, 1990; National Safety Council, 1992). Although rates of pedestrian injuries have decreased slightly in recent years, children who walk and play near roadways are still in danger, as 1,100 youths under the age of 14 are killed annually in road environments (Wilson et al., 1991). In addition to these more conventional sources of morbidity and mortality, new threats to children's physical well-being are continually emerging. In-line skating, for example, which has gained tremendous popularity in the short time since its inception, is now recognized as a major source of childhood injury, particularly in the form of bone fractures occurring to those under 20 years of age (Adams, Wyte, Paradise, & del Castillo, 1996; Pudpud & Linares, 1997).

In response to the alarming rates of unintentional injuries suffered by children in the course of routine play and recreational activities, various controlled studies have examined the real-world effectiveness of safety equipment usage in preventing injuries. These investigations have documented clear improvements in safety across various injury categories. One of the most impressive effects has been found for bicycle helmet usage, which may reduce the risk of head injury by more than 80% (Thompson, Rivara, & Thompson, 1996; Thompson, Rivara, & Thompson, 1989). A similarly high degree of protection has been attributed to wrist guards and elbow pads worn by children as protection while rollerblading (Schieber et al., 1996). The use of personal flotation devices (a.k.a. life jackets), which effectively keep swimmers' heads above water, is recommended in the United States by the Coast Guard, the National Transportation Safety Board, and the American Academy of Pediatrics (Hermann & Stormer, 1985; U.S. Coast Guard, 1995). There is also an indication that painted crosswalks may decrease the risk of pedestrian injury for young children (Young & Lee, 1987).

Supported by data from these and other intervention studies, preventionists have long touted the regular use of safety equipment as one of the best front-line defenses against unintentional pediatric injury. Rarely considered in the child injury literature, however, is the possibility that safety equipment usage may itself elicit some systematic behavioral change with the potential to affect injury outcomes. If, for example, the protective value of safety equipment brings with it a perception of invulnerability to injury, children or the adults who supervise them may respond with an increased tolerance for risky or reckless behavior. More specifically, the sense of security imparted by safety equipment may lead to increased risk taking by children—or greater tolerance for risk on the part of supervising parents—either of which might increase the likelihood of injury. The potential impact of these processes on injury rates is easily understood by considering the familiar example of football players, who would be much less inclined to hurl themselves at one another in such an unrestrained manner without the feeling of protection provided by pads and a helmet.

This premise, that individuals alter their behavior in response to changes in perceived risk, forms the basis of a formal theory of risk behavior known as "risk compensation" or "risk homeostasis." According to this theory, developed largely by Wilde (1982, 1994, 1998), individuals have an optimal or "target" level of risk with which they are most comfortable and which they strive to maintain in a given risk situation. People are said to respond to decreases in perceived risk in a given situation by increasing risk behaviors in an attempt to hold relatively constant their individual target level of risk (Wilde, 1994). The net result of these compensatory behaviors, according to Wilde (1982, 1998), is that overall injury rates will remain essentially unchanged, even in the presence of interventions intended to improve safety.

Although risk compensation is believed to occur in response to a variety of risky situations (Wilde, 1982), empirical investigation of the theory has been limited primarily to studies of adult driving behavior. Several investigations utilizing both actual and analogue driving tasks have reported evidence of compensatory behaviors (e.g., faster driving) among participants randomly assigned to a seat belt condition (Aschenbrenner & Biehl, 1994; Jackson & Blackman, 1994; Streff & Geller, 1988). On the other hand, risk homeostasis theory has been the subject of considerable debate in the literature, with several writers criticizing the conceptual underpinnings of the theory, including the contention that overall injury rates will remain unaffected by the implementation of common safety measures such as automobile safety belts and airbags (see, for example, McKenna, 1988; O'Neill & Williams, 1998; Slovic & Fischhoff, 1982). In the realm of childhood injury, the many studies documenting net reductions in injury rates resulting from the use safety equipment suggest that whatever compensatory processes may occur probably do not involve a strict homeostatic mechanism operating to counteract completely the protective value of safety equipment used by children. It is nevertheless quite possible that some offsetting behaviors may occur in response to safety equipment usage, resulting in increased risk tolerance among children or the caregivers who supervise them. If this is the case, then the effectiveness of common safety equipment used by children may, to some degree, be diminished. Although other child injury specialists (e.g., Peterson, 1984) have alluded to risk compensation processes by suggesting that perceptions of increased physical safety could lead to less vigilant supervision on the part of parents, we are unaware of any controlled experimental efforts to examine the phenomenon of behavioral compensation related to pediatric injury.

This study seeks to assess self-reported compensatory behaviors in a sample of 8- to 13-year-old children and their mothers. During the preadolescent years, youths spend much of their time under the watchful eye of adult supervisors who are expected to carefully monitor and regulate children's risk-taking behaviors to protect them from injury. Yet, with advancing age, children spend increasing amounts of time in unsupervised settings, where they alone must make decisions regarding physical risks. Because of the dual influences on youths' injury-relevant behaviors, we chose to assess compensatory tendencies in both children and their maternal caregivers. Using a between-subjects design, we randomly assigned child participants and mothers to view several risk-taking scenarios depicting children either using or not using common safety equipment. Child participants in each condition were asked to report the maximum level of risk in which they would engage; mothers reported the maximum risk level they would permit their child to take. Responses from both groups were used to evaluate the prediction that safety equipment usage results in increased tolerance for physically risky behaviors among children and their maternal caregivers.

METHOD

Participants

Participants were recruited by means of letters sent to the parents of a randomly selected subsample of all children enrolled in grades 3 through 7 in the local public school system, over a period of 6 months. Follow-up phone calls were made approximately 1 week after the letters were mailed, to solicit the participation of the identified child and his or her mother in the study. Because mothers typically bear a disproportionate responsibility (relative to fathers) for supervising their children's activities, only mothers were invited to contribute data, along with the identified child. Incentives for participating families included a substantial discount toward the purchase of a bicycle helmet provided to all participants, as well as a lottery with two bicycles and three smaller gift certificates offered as prizes. Of the 346 parents who were contacted, 151 (44%) agreed to participate in the project, kept scheduled interview appointments, and provided complete data.

Measures

Risk-taking Measure. The risk-taking stimulus materials used to assess mothers' and children's self-reported tolerance for physical risk taking were adapted slightly from a measure developed by Potts and his colleagues (Potts, Doppler, & Hernandez, 1994; Potts, Martinez, & Dedmon, 1995). The measure consisted of seven 12 × 18-inch pictorial illustrations of school-age children engaged in common play activities involving some level of physical risk. In each scenario a five-interval gradation of risk was represented. That is, the picture showed different degrees of risk, which reflected proximity to a potential injury source. For each illustration mothers reported the maximum acceptable level of risk they would allow their children to engage in while in their presence; children reported the maximum amount of physical risk they would take if left unsupervised.

The seven risk items were chosen to represent a range of common injury risks in children's environments. These items (with corresponding questions asked of mothers) included (1) riding a bicycle down hills of variable steepness and height ("How high a hill would you allow your child to ride down?"); (2) jumping a bicycle various distances off of a small ramp

("How far would you allow your child to jump?"); (3) swimming varying distances out into a body of water to retrieve an errant frisbee ("How far out would you allow your child to swim?"); (4) crossing a street to retrieve a ball, with a car approaching from varying distances ("When would you allow your child to cross the street?"); (5) riding in-line skates down hills of varying steepness ("How high a hill would you allow your child to ride down?"); (6) climbing up a tree to retrieve a kite at varying heights ("How high would you allow your child to climb?"); and (7) approaching an unknown, chained dog to retrieve a frisbee ("How close would you allow your child to get to the dog?"). As noted, each child participant was asked to report the maximum level of risk he or she would take in each risk scenario.

During administration of the measure, a small illustrated figure of a child of the same sex and appearing approximately the same age as the child respondent was initially placed at the lowest risk level in each illustration. If a participant reported tolerance for this initial level of risk, the figure was then placed at the next higher level of risk and the participant was queried again about the acceptability of engaging in that behavior. This process was repeated until the respondent indicated a maximum level of acceptable risk, at which point a score ranging from 1 (lowest risk) to 5 (greatest risk) was assigned for the item. In this manner, Likert-type ratings ranging from 1 to 5 could be assigned to mother and child reports. On occasions when even the lowest level of risk was unacceptable, a score of 0 was assigned. Scores were averaged across items to obtain an overall indicator of acceptable risk.

Potts et al. (1995) have reported psychometric properties for the risk-taking measure, including moderate internal consistency and convergent validity with self-report measures of sensation seeking, as well as with peer, teacher, and parent ratings of risk-taking behavior, and actual injury history. This instrument thus serves as a safe and apparently accurate proxy measure for actual physical risk-taking behaviors among children.

Injury Frequency History. Parents completed a child injury history questionnaire that assessed lifetime frequencies of injuries experienced by their child, including broken bones, muscle strains, serious cuts, concussions, burns, poisoning, animal bite, insect stings/bites, water inhalation, shock, and other (miscellaneous). Injuries were classified as either medically treated or not medically treated. Each of these was summed for two overall injury scores.

Direct Experience and Safety Equipment Measures. To assess past direct experience with the seven risk-taking situations, we asked child participants to designate the frequency with which they had actually engaged in the basic activity represented in each of the seven scenarios, using a 5-point scale (1 = never, 2 = once in a while, 3 = every other day, 4 = most days, and 5 = every day). Thus, children reported how often they rode a bicycle, did tricks on a bike, used rollerblades, swam in a pool or lake, climbed trees, and crossed streets alone "in the summertime or when the weather is nice outside." Scores were averaged across items to obtain an overall indicator of direct experience with the risk activities.

A 3-point scale (1 = never, 2 = sometimes, and 3 = every time) was then used to assess participants' use of safety equipment appropriate to each situation. Children were asked to report their use of helmets for bicycling; elbow pads, knee pads, wrist guards, and helmets for rollerblading; and life preservers for water activities.

Demographic Questionnaire. Finally, a questionnaire was completed by parents to assess demographic information such as child's age, gender, and ethnicity, as well as parental marital status, education, and occupation.

Experimental Design and Procedures

Data were collected during individual testing sessions, prior to which participants had been randomly assigned to either an experimental or control condition. Each data collection session lasted approximately 30 minutes and occurred in either the family's home or on campus, according to their preference. For participants in the experimental condition, safety equipment or features were depicted in five of the seven the risk scenarios (1-5); these included the child figure wearing a helmet in the bicycle scenes; elbow pads, knee pads, wrist guards, and a helmet in the rollerblading scene; a life preserver in the water scenario; and using a crosswalk in the pedestrian scenario. Participants in the control condition viewed the same five scenarios, but with all safety equipment and protective features deleted from the pictures. For the remaining two risk scenarios (6 and 7), participants in both conditions viewed identical stimulus materials. These last two items thus served as a manipulation check: the presence of group differences in ratings of items 1-5, but

Table I. Injury-Related Measures by Condition

	No safety equipment (n = 69) M (SD)	Safety equipment (n = 82) M (SD)
Direct experience scores	2.75 (.65)	2.72 (.63)
Average safety equipment usage	1.98 (.60)	2.16 (.59)
Injury frequency history (nontreated)	1.82 (1.76)	1.59 (1.72)
Injury Frequency history (treated)	1.04 (1.29)	.83 (1.03)

All differences between groups are not significant at $p < .05$.

not items 6 and 7, would support the strength of manipulating the presence of safety equipment. The order of scenario presentation was systematically varied using seven random series of the risk items. Experimenters rotated though these series during data collection to balance possible order effects.

After discussion and completion of parental consent and child assent forms (and with children out of earshot), experimenters completed the risk-taking measure with each mother. Mothers then completed the demographic and injury history questionnaires. With mothers out of the room, children were then administered the risk-taking measure, as well as the direct experience and safety equipment measures, which the experimenter read aloud to them. Following both interviews, participants were debriefed as to the purpose of the study, and children were engaged in a discussion about the potential dangers of several of the depicted activities. All experimental procedures were in compliance with the American Psychological Association's (1992) ethical guidelines for research and were approved by the University of Missouri Human Participants Review Committee.

RESULTS

Group Comparability

Participants in the experimental (Safety Equipment) and control (No Safety Equipment) conditions were compared with respect to several injury-relevant variables (i.e., injury history, direct experience, and safety equipment questionnaires; see Table I), as well as demographic indices (child sex, ethnicity, age, and socioeconomic status [SES]). *T* tests and chi-squares revealed no significant differences between conditions on any of these variables. Our sample of 151 mother-child dyads was evenly divided by gender (75 boys and 76 girls), predominantly white (92% Caucasian, 5% African American, and 3% other ethnic minority), and reported a mean child age of 10.8 years (range: 8.4–13.6, SD = 1.4). SES, computed using the Hollingshead Two Factor Index (Hollingshead, 1957), ranged from 14 to 66, with a mean of 49.1 (SD = 13.2), reflecting a broad range of SES in our sample, with the average participant being of middle to upper-middle SES.

Effect of Safety Equipment Manipulation

Mother and child ratings of acceptable risk were averaged across the five manipulated scenarios and two constant scenarios, yielding two risk summary scores for each informant. Mothers' summary scores for the manipulated scenarios demonstrated adequate reliability (Cronbach's α =.74), although the two constant scenarios were less so (α =.35), probably because one of them yielded a floor effect for mothers, who most often disapproved of their children approaching the dog at all. The child summary scores for manipulated and constant scenarios achieved alphas of .80 and .70, respectively. These summary scores are depicted for mothers and children, by condition, in Table II.

Of the four summary scores (mother and child across both manipulated and constant scenes), only the mother ratings of manipulated scenes demonstrated an effect of condition; $t(149) = 4.82$, p =.001. Figure 1, which depicts maternal ratings for each scenario, by condition, shows a pattern of greater risk tolerance reported by mothers in the safety condition across all five risk items. The constant scenes yielded virtually identical risk ratings across conditions for both mothers and children. Although this general pattern appears to confirm the utility of the constant items (6 and 7) as a check on the manipulation of safety equipment across conditions, support for this conclusion is limited somewhat by the restricted response range for mothers on the "approach a strange dog" item. Subsequent analyses focused on the manipulated scenes only.

Table II. Acceptable Risk Levels by Informant Condition

	No safety equipment *M* (*SD*)	Safety equipment *M* (*SD*)	Significance
Risk mother would permit			
Manipulated scenes	1.59 (.96)	2.31 (.87)	*
Constant scenes	.93 (.79)	.92 (.74)	*ns*
Risk child would take			
Manipulated scenes	2.41 (1.12)	2.60 (1.01)	*ns*
Constant scenes	1.50 (1.26)	1.52 (1.37)	*ns*

* $p < .01$; *ns* = not statistically significant at $p < .05$.

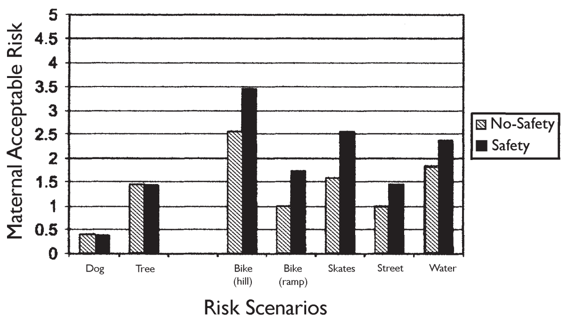

Figure 1. Mean maternal ratings of acceptable risk levels, by risk scenario, for Safety Equipment (n = 82) and No Safety Equipment (n = 69) conditions. The two constant scenarios appear to the left, and the five manipulated scenarios are on the right.

Table III. Summary of Three-Way Analysis of Variance for Experimental Condition, Child Sex, and Respondent

Source	*df*	*SS*	*MS*	*F*
Experimental condition	1	19.57	19.57	17.58*
Child sex	1	28.60	28.60	25.70*
Respondent	1	21.42	21.42	35.16*
Condition x respondent	1	4.26	4.26	6.99*
Condition x child sex	1	3.04	3.04	2.73
Respondent x child sex	1	5.04	5.04	8.29*
Error	147	89.56	.61	

* $p < .01$.

Comparing Mother and Child Risk Ratings

To characterize the effect of experimental condition and child sex on risk ratings, a 2 (condition, safety vs. no-safety, between subjects) × 2 (child sex, male vs. female, between subjects) × 2 (respondent, mother vs. child, within subjects) repeated measures ANOVA was conducted, with ratings of acceptable risk (the first and third rows of Table II) as the dependent variable. Of particular interest were two potential interaction effects on risk ratings: Condition × Respondent, indicating a difference in how the experimental manipulation affected the risk tolerance of mothers versus children, and Condition × Child Sex, indicating a difference in how the experimental ratings affected risk ratings for boys versus girls. The former was confirmed, $F(1, 147) = 6.99$, $p = .009$ (see Table III). Visual examination of the means presented in Table II reveals that mothers' ratings were lowest—and discrepant from child ratings—in the no-safety condition but approached child ratings in the presence of safety equipment.

The interaction between condition and child sex fell short of statistical significance, $F(1, 147) = 2.73$, $p = .10$, indicating that the effect of the safety equipment manipulation on both mothers' and children's ratings did not show a strong pattern of difference by child gender (see Table IV). Further inspection of the mother ratings only, however, suggests a pattern in which the upward drift of maternal risk ratings in the presence of safety equipment (reported above) appears more substantial for sons than for daughters. Mothers' ratings approach children's ratings in the safety condition, for both boys *and* girls. Nevertheless, because the risk ratings offered by girls are relatively low in comparison with the boys', the increment required for maternal ratings to approach child ratings in the Safety condition is smaller for girls.

Finally, although we have demonstrated a convergence of the average mother's and child's risk ratings in the safety condition, some index of covariation at the level of individual mother-child dyads would be helpful. Pearson correlation coefficients, reflecting correspondence between risk ratings offered by mother and child dyads (for manipulated scenarios only) yielded values of .51 ($p < .001$) for the safety condition and .20 ($p = .10$) for the no-safety condition.

Table IV. Acceptable Risk Levels for Manipulated Scenarios Only, by Informant, Condition, and Child Sex

	No safety equipment M (SD)	Safety equipment M (SD)
Risk mother would permit		
Boys	1.62 (1.10)	2.68 (.91)
Girls	1.57 (.78)	2.01 (.70)
Risk child would take		
Boys	2.76 (1.15)	3.13 (.86)
Girls	1.97 (.93)	2.16 (.92)

Maximum score = 5.

DISCUSSION

To our knowledge, this is the first study to specifically investigate the phenomenon of behavioral compensation related to childhood injury. At issue here was whether participants' tolerance for physical risk taking, across several popular but potentially hazardous childhood activities, would vary as a function of safety equipment usage. Theories of risk compensation suggest that, all other factors being equal, individuals who use protective equipment will engage in greater levels of physical risk than those who do not. Here, in comparison to mothers in the no-safety condition, those viewing safety stimuli reported significantly greater tolerances for children's risk-taking behaviors across all of five manipulated risk scenarios. Assuming equivalence of groups (which is likely given our sample size, random assignment of participants, and a lack of group differences on a number of potentially confounding variables), it is reasonable to conclude that the increased acceptance of risk by mothers in the safety condition was in fact due to the experimental manipulation of safety equipment between conditions. In contrast to mothers, child participants demonstrated no significant group differences in risk taking in response to either manipulated or constant scenarios. These results and their implications for injury prevention will be discussed in the context of risk compensation processes.

Maternal Risk-Taking Reports

As noted, mothers in the safety condition were significantly more lenient in their standards for risky behavior on the part of their children. These loosened restrictions were evident for children of both sexes (though somewhat more so for sons than daughters) across all five scenarios including the bicycle, water, in-line skating, and pedestrian risk situations. The greater acceptance of risk taking reported by mothers in the safety equipment condition may have resulted from an increased confidence in their children's physical well-being, engendered by the presence of protective equipment in the risk scenarios. This finding may constitute cause for concern, because of the possibility that supervising adults who permit greater risk taking when children use protective equipment may unwittingly undermine the intended function of that equipment, exposing children to a greater likelihood of injury than might exist under conditions of constant supervisory vigilance.

An additional point of interest emerged from comparisons of mothers' and children's mean risk levels across the safety and no-safety conditions. When viewing unprotected figures, mothers were more conservative than children in the risk levels they endorsed. That is, caregivers permitted less risk taking than their sons or daughters reported they would take. This probably reflects greater safety awareness and more accurate judgments of physical risks on the part of adult caregivers. Surprisingly, however, these differences were not maintained across conditions, as mothers in the safety condition reported risk levels that approached those provided by children. Thus, in the presence of safety equipment, caregivers reported a relaxed tolerance for risky behaviors, allowing both boys and girls to engage in similar levels of risk that children themselves would take while unsupervised and without the aid of protective equipment. To the degree that these tendencies reflect real-world behaviors, mothers of children who use protective equipment may be undercutting the crucial role they as caregivers play in limiting risky child behaviors that could lead to injury.

Additional information regarding the correspondence between risk ratings can be found in our correlational data showing a strong positive relationship between maternal and child risk tolerances in the safety condition, but not in the no-safety condition. These findings supplement the group data, again suggesting a convergence of mother and child risk ratings in the presence of safety equipment. These results indicate the possibility of some transmission of attitudes or tolerances toward risk between mother and child. Such influences could conceivably be either unidirectional or bidirectional (i.e., mother to child, child to mother, or both).

Child Risk-Taking Reports

Analyses of gender differences in risk taking showed boys selecting greater levels of risk than did girls, in both the safety and no-safety conditions. These data are congruent with previous research on childhood risk taking and injury (e.g., Kafry, 1982; Matheny, 1991; Potts et al., 1995; Zuckerman, 1979), finding that boys consistently demonstrate higher levels of risk taking (and suffer more injuries) than girls. More germane to this study was a lack of support for the hypothesis that children viewing safety figures would evince greater levels of risk taking than their no-safety counterparts. Although the overall pattern of means suggested higher risk tolerance among safety participants on four of five risk scenarios, these differences were not statistically significant. This finding may in part reflect children's lack of knowledge about the protective function of safety equipment (e.g., perhaps helmets are just another type of hat to them). It is also possible that children who are distracted by the excitement of play activities simply become oblivious to the presence of safety equipment, rendering it inconsequential to their risk-taking decisions. In such cases, dispositional variables (e.g., sensation seeking, impulsivity, activity level), which have been empirically linked to physical risk taking and injury (DiScala, Lescohier, Barthel, & Li, 1998; Kafry, 1982), may supersede whatever impact safety equipment might have on children's willingness to engage in risky behaviors.

Implications for Injury Prevention

Here, parents reporting as though their children were using protective equipment permitted significantly increased levels of child risk taking. Although we cannot be certain whether a shift in risk tolerances of this magnitude would translate in an increased risk of actual injuries, one might reasonably predict that significant increases in risk taking would be accompanied by a greater likelihood of injury-producing events (e.g., falls while rollerblading, bicycle crashes, etc.) of a severity beyond the ability of safety equipment to contain. In this manner, the protective value of equipment may be undermined to some extent by compensatory behaviors. Thus, interventions that promote safety solely by encouraging increased utilization of safety equipment may be missing an important piece of the injury prevention puzzle: the need to consider behavioral responses to safety equipment usage. A twofold strategy of promoting safety equipment usage *and* discouraging the loosening of standards for safe behavior in the presence of such precautions may therefore have the potential for improved effectiveness over equipment-only interventions. Reminding caregivers who may overestimate the protective value of safety equipment that such measures neither confer invulnerability to injury nor reduce the need for vigilant supervision of children seems a logical first step in this process. Parents could be instructed not only to insist on the use of proper safety equipment but also to maintain the enforcement of safe standards of behavior in the presence of such measures.

Our failure to find evidence of compensatory behaviors among child participants may be an encouraging sign regarding children's risk behaviors in unsupervised settings. If children's real-world risk behaviors parallel their self-reports here (i.e., if children are not inclined to take greater risks when they use safety equipment), this suggests that youths who are unsupervised, but using safety equipment, may be receiving the maximum benefit from that equipment.

Limitations and Future Directions

Several methodological features of this study shed light on directions for future research in the area. The first issue concerns the between-subjects nature of the design, which compared risk reports of different groups of participants under two separate conditions. Because risk compensation is believed to operate at an individual as well as an aggregate level (Wilde, 1988), a within-subjects design assessing the same individuals under two conditions (one "safety," one "no-safety") could provide unique information not available from a between-subjects design. Such a study could evaluate the extent to which risk compensation may result from a "contrast effect" produced when an individual switches from nonuse to use of some type of safety equipment (Streff & Geller, 1988). A second issue concerns our use of a self-report measure to assess child and maternal risk-taking tendencies. Although this instrument has demonstrated some degree of validity, the possibility remains that mothers' or children's real-world tolerances for children's risk behaviors differ from the reports provided here. An observational measure would allow for greater confidence in the assessment of participants' risk-taking behaviors. Third, a more thorough knowledge of risk compensation processes could be gained from attempts to explore the specific mechanism by which risk compensation is said to occur (i.e., the role that risk perceptions play in risk behaviors following the introduction of safety equipment). Though shifts in risk perceptions could be inferred from the present data, they were not measured here directly. Finally, in further establishing the parameters within which risk compensation occurs, it will be crucial to consider the relevance of developmental changes in risk compensation tendencies. The question of whether compensatory shifts in parental tolerance for children's risk taking vary as a function of child age may have implications for the tailoring of interventions strategies to different parental and child cohorts.

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