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Understanding children's injury-risk behavior: Wearing safety gear can lead to increased risk taking

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Abstract

The present study examined whether school-age children show *risk compensation* and engage in greater risk taking when wearing safety gear compared to when not doing so when running an obstacle course containing hazards that could lead to physical injury. Because sensation seeking has been shown to influence risk taking, this child attribute was also assessed and related to risk compensation. Children 7–12 years of age were videotaped navigating the obstacle course twice, once wearing safety gear and once without safety gear, with reverse directions used to minimize possible practice effects. The time it took the child to run through the course and the number of reckless behaviors (e.g., falls, trips, bumping into things) that the child made while running the course were compared for the *gear* and *no-gear* conditions. Results indicated that children went more quickly and behaved more recklessly when wearing safety gear than when not wearing gear, providing evidence of risk compensation. Moreover, those high in sensation seeking showed greater risk compensation compared with other children. Implications for childhood injury prevention are discussed.

Keywords: Children; Unintentional injury; Safety gear; Risk taking; Risk compensation

In the United States, as well as many other industrialized nations, unintentional injury is the leading cause of death for children (Canadian Institute of Child Health, 2000; National Center for Injury Prevention and Control, 2000). In fact, more children in the United States die from injuries than from all other diseases combined (Rodriguez, 1990). Injury is also a leading cause of hospitalization during childhood. Estimates indicate that approximately 25% of children in the United States require treatment for injuries each year (Scheidt et al., 1995). In fact, it has been estimated that as much as 15% of all money spent on medical costs for children 1–19 years of age in the United States is for treatment or rehabilitation related to unintentional injury (Miller et al., 2000). Thus, unintentional injury is a pervasive and costly health problem that affects the lives of many children.

Increasing awareness of the fact that many childhood injuries are preventable (Philippakis et al., 2004; Rimsza et al., 2002) has led to calls for research to elucidate the factors that contribute to injury and develop strategies to prevent these events (Miller et al., 2000). For school-age children, injuries often occur when they are unsupervised and making their own decisions about risk taking (Morrongiello, 1997; Shannon et al., 1992; Scheidt et al., 1994). Hence, identifying those factors that lead children to engage in *physical risk-taking behavior* (i.e., a behavior that could result in physical injury when there are alternative behaviors that do not do so) is essential to support the development of evidenced-based prevention programs.

Epidemiological studies reveal that many injuries to children occur during normative, age-appropriate play activities. For instance, cycling-related injuries have been associated with 400 deaths and nearly 400,000 emergency room visits each year for children less than 15 years of age (Wilson et al., 1991). Injury due to falls is also common among young persons. For example, it is estimated that 30% of fall related injuries in children and youth occur at their place of residence and approximately 20% involve falls on playgrounds. Similarly, in-line skating, which has gained tremendous popularity in the short time since its inception, is also recognized as a major source of childhood injury, particularly bone fractures (Pudpud and Linares, 1997). Given that children are at risk of injury during age-appropriate activities that yield numerous health-promoting benefits (e.g., exercise, weight control, etc.) that one would not want to curtail, the approach to managing risk has been one of developing

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and advocating for use of safety gear to provide greater protection of the body, thereby reducing risk of injury during these activities.

Safety equipment is widely recognized as a means of reducing injury risk. Helmet use while riding a bicycle reduces the risk of head injury by 69%, of brain injury by 65%, and of severe brain injuries by 74% (Thompson et al., 1996). Wrist guards, elbow pads, knee pads and helmets help protect against injury while in-line skating (Scheiber et al., 1996). Thus, several lines of evidence indicate that use of safety gear can substantially reduce children's risk of injury.

The results of other research, however, indicate that use of safety gear may result in mis-perceptions of injury risk and this can produce unwanted effects. Specifically, individuals may assume that safety gear *completely* protects against all injury, and therefore the need to be cautious no longer exists, resulting in greater risk taking or increased tolerance for risk taking. This phenomenon is known as *risk compensation*. Although risk compensation is discussed under a variety of names in the literature (e.g., risk homeostasis theory, Simonet and Wilde, 1997; offsetting behavior theory, Peterson et al., 1995), the underlying common principle is that individuals respond to environmental or product design changes that serve to decrease risk of injury by actually increasing their risk-taking behavior (Hedlund, 2000). Not surprisingly, this notion has sparked considerable debate among injury prevention specialists (Adams and Hillman, 2001; Wilde et al., 2002), and led to recognition of the need for further rigorous research on this issue (Thompson et al., 2001).

Support for this notion comes mostly from studies of adult behavior, including driving behavior (e.g., Simonet and Wilde, 1997; Peterson et al., 1995; Potvin et al., 1988; Streff and Geller, 1988; Stanton and Pinto, 2000) and reactions to product-safety initiatives. For example, Wilde conducted studies demonstrating that as safety features are added to vehicles and roads, drivers tend to increase their exposure to collision risk by driving more recklessly because they feel better protected (Wilde, 1982, 1998, 2002). Similar reactions have been found in response to other product safety initiatives: parents reacted to the introduction of safety mechanisms on cigarette lighters by taking fewer precautions with respect to lighters and fire safety (Viscusi and Cavallo, 1996; Viscusi, 1984, 1985). A recent study of parents' responses to children wearing safety gear during common play activities (e.g., bicycling, in-line skating, sledding) also revealed risk compensation. Comparing the risk behaviors that parents would allow when their children did and did not wear safety gear revealed that parents showed greater tolerance for risk and would allow their children greater risk taking when wearing safety gear compared to when not wearing safety gear (Morrongiello and Major, 2002). Similar behavioral reactions have been found for adults when using safety gear during sports activities. While playing soccer, for example, it has been noted that when the kicker and goalie both wore protective gear, then the kicker moved closer to the goalie. In other words, kickers altered their behavior in order to compensate for the reduction in perceived risk, thereby increasing risk of injury (Braun and Fouts, 1998). In summary, under a variety of conditions, adults have been shown to react to safety initiatives by increasing their own risk behavior or tolerating greater risk taking by their children.

Building on these findings, the aim of the present study was to determine if children show risk compensation in reaction to wearing safety gear. Surprisingly few studies have addressed this important issue regarding children, and those studies on this topic have not used ecologically valid tasks and assessed children's *actual* risk taking behavior in reaction to safety gear. Rather, most studies have only asked children to imagine themselves in a situation and report on how they might react, which may or may not reflect how they would actually behave in injury-risk situations.

For example, DiLillo and Tremblay (2001) presented children 8–13 years hypothetical play situations and asked them to report the maximum level of risk in which they would engage. Researchers had predicted that the participant's tolerance for physical risk taking would vary as a function of safety equipment usage. However, the children did not show differences in risk taking between gear and no-gear conditions, probably because a between-subjects design was used (i.e., *different* children responded under 'gear' and 'no-gear' conditions) and a within-subjects design is essential to observe risk compensation (cf. Streff and Geller, 1988). By contrast, results of a recent study in which children 6–16 years old were administered questionnaires and asked to indicate the level of risk taking they would show when they were and were not wearing protective equipment during play activities, provided support for risk compensation. The majority of children reported changes toward riskier behavior when using protective gear (Mok et al., 2004). Similarly, when children 6–12 years were shown drawings depicting different risky play situations (e.g., swimming at a lake, cycling down a hill) and asked to indicate what level of risk they would take, they reported greater risk taking when wearing safety gear than not doing so (Morrongiello et al., 2006). Of course, what children report in reaction to hypothetical situations may not accurately reflect how they actually behave. Thus, what is needed is a task that allows researchers to directly measure whether children show risk compensation in real-life situations. In addition, it would be useful to examine if child attributes differentiate those children who are likely to show risk compensation from those not so inclined.

There is increasing evidence that children differentially engage in risk behaviors based on individual-difference characteristics (e.g., thrill seeking: Morrongiello and Matheis, 2004; Morrongiello and Sedore, 2005; behavioral intensity and inhibitory control: Morrongiello et al., in press; Schwebel and Bounds, 2003), but no one has yet examined how these attributes influence the likelihood of risk compensation occurring. One might hypothesize, for example, that if an attribute made one more susceptible to risk taking, then it may also make one more likely to respond with increased risk taking if conditions (e.g., use of safety gear) led one to believe that risk of injury was reduced. Thus, while risk compensation may occur for all children, it may manifest as a particularly robust and sizable effect in those already inclined towards taking risks.

These issues were addressed in the present study. The same children participated in an actual risk-taking task, under gear and