Perceived Risk, Risk Taking, Estimation of Ability and Injury Among Adolescent Sport Participants

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Objective  To determine the predictive validity of perceived risk, risk taking, estimation of ability, overefficacy, and previous injuries on actual injury among adolescents in sport; and to examine sex differences on these factors.  Methods  A cohort of 260 (148 male, 112 female) soccer players aged 11 to 14 years participated in a 3-month prospective injury study. Preseason written measures included self-reported perceived risk, previous injuries, risk taking and estimation of ability.  Results  Low levels of perceived risk and estimation of ability were associated with a significant increase in risk of injury, with odds ratios (ORs) ranging from 3.77–7.92. Positive relationships between injury and both estimation of ability and overestimation of ability were supported. Estimation of ability was also positively related to risk taking. In this study, however, risk taking was not directly related to injury, nor were previous injuries. Girls reported higher levels of perceived risk and lower levels of risk taking than boys. However, boys and girls reported similar estimation of ability and overestimation of ability and subsequently incurred similar numbers of injuries.  Conclusions  Perceived risk and estimation of ability represent significant psychological risk factors for injury in adolescent sports. Sex differences in perceived risk, risk taking, and previous injuries should be considered when developing environmental and behavioral injury-prevention programs.

Key words  injury; perceived risk; risk taking; estimation of ability; adolescents; sports.

Unintentional injuries represent a major health concern among adolescents (Rodriguez, 1990). In general, the risk of unintentional injury peaks in adolescence (Scheidt et al., 1994), when children are susceptible to engaging in risk taking (Potts, Martinez, & Dedmon, 1995). Risk taking in sport involves activities such as diving to head the ball in soccer and sliding headfirst at a base in baseball. The proportion of serious injuries resulting in long-term or permanent disability or disfigurement that occur as a result of sports participation among athletes aged 10 to 13 years is significantly higher than that for any other age group of youth athletes (Bijur et al., 1995). Moreover, approximately 2.9 million youth sport injuries occur annually in the United States (Bijur et al., 1995). The need to examine the underlying factors influencing the injury process among adolescents in sport is evident.

Risk taking may play a significant role in determining the likelihood of injury among adolescents in sport. Researchers, however, have yet to examine the relationship between risk taking and injury among adolescents in sport. Using a nonsport sample of 6- to 10-year-old children, Morrongiello and Rennie (1998) examined self-reported injury-risk behaviors and injury attributions and vulnerability in active play environments. They reported that boys engaged in significantly more risk taking than girls. Girls typically perceive more injury risk than boys in childhood play activities (Hillier & Morrongiello, 1998; Morrongiello & Rennie, 1998) and adolescent sport participation (Kontos, Feltz, & Malina, 2000). Peterson, Oliver, Brazeal, and Bull (1995), however, reported no differences between eighth-grade girls and boys in cognitions and beliefs about being injured while riding a bicycle.
Children with higher risk-taking scores attributed injuries more to luck than to their own actions, and they believed themselves to be less likely to be injured than peers (Morrongiello & Rennie, 1998). In contrast, children who reported fewer risk-taking behaviors rated themselves as more likely to be injured than their peers (Morrongiello & Rennie, 1998). This effect was greater for girls than boys. This finding supports the notion that young athletes who have a low perceived risk of injury may actually engage in more risk-taking behaviors, thus exposing themselves to greater risk of injury. Further support of an inverse relationship between perceived risk and risk taking was observed in fourth graders by Cook, Peterson, and DiLillo (1999). Their findings also indicate that children's perceived risk is a good indicator of actual (i.e., observed) risk-taking behaviors. The relationship between perceived risk and risk taking may be mitigated by an athlete's previous experiences and outcomes related to risk taking. Horvath and Zuckerman (1993) have suggested that past successful experiences with risk taking may lead to a reduction in perceived risk, potentially increasing the likelihood that an athlete would take risks in sport. Consequently, it is difficult to ascertain causation between risk taking and perceived risk. Boys may also be less likely than girls to internalize their past negative experiences with injury; furthermore, boys may be more likely than girls to attribute negative experiences to external factors, such as bad luck (Morrongiello, 1997). This finding implies that previous injuries resulting from risk taking in sport may not decrease the likelihood of subsequent risk taking among boys.

Another factor that might influence the perceived risk and risk-taking relationship is self-efficacy. Bandura (1997) suggests that athletes who perceive a situation as risky have low self-efficacy, a higher anticipation of failure, and thus a greater potential for injury. Conversely, athletes who are high in self-efficacy are more likely to attempt difficult skills or skills that involve calculated, as opposed to reckless, risks. Hence, athletes high in self-efficacy should be more likely to engage in risk taking in sport. Bandura (1997) extends this hypothesis to suggest that some individuals may in fact overestimate their ability or perceive themselves to be better than they really are. An overestimation of ability may lead to a sense of invincibility and a decision to engage in more risky and potentially injurious behaviors (Bandura, 1997). For example, young soccer players who overestimate their abilities and inaccurately perceive playing soccer to be a low-risk activity may engage in behaviors on the field, such as late tackles and aggressive play, that place them at high risk for injury.

Overestimation of ability has been demonstrated in children as young as 9–12 years old (Chase, Ewing, Lirgg, & George, 1994). Overestimation of ability has not been examined among adolescents in sport; however, the initial report by Chase et al. (1994), on children's inflated levels of self-efficacy and on adolescents' propensity to take risks, suggests that adolescent sport participants would exhibit similar trends. Overestimation of ability in a particular sport and a concomitant, inaccurately low-perceived risk of injury may lead a sport participant to engage in reckless, as opposed to calculated, risk taking and may increase one's probability of injury. However, in a study using observed measures of estimation of physical abilities, Schwebel and Plumert (1999) reported no direct relationship between either under- or overestimation of ability and injury. The same researchers found that overestimation of ability was related to inhibitory control (i.e., approach tendency), which in turn was positively related to injury. This finding suggests that overestimation of ability may influence injury indirectly via its effect on risk-taking tendencies. In regard to sex differences in estimation of ability, research suggests that in a masculine-defined environment (i.e., a contact team sport), boys will report higher estimation of ability than girls (Lirgg, 1991).

Research has provided some support for previous injuries as a predictor of subsequent injuries in children (Jaquess & Finney, 1994). In fact, Jaquess and Finney (1994) reported that previous medically treated injuries accounted for 33% of the variance in subsequent medically treated injuries during the following year. Williams and Andersen (1998) have proposed that previous injuries increase the subsequent likelihood for injury among athletes. They contend that athletes with previous injuries, particularly if psychological recovery from the injury is not completed, will be susceptible to anxiety and negative cognitive appraisals of the sport environment (e.g., high perceived risk). Negative cognitive appraisals of a previous injury will lead to a decreased self-confidence and a fear of risky situations in sport. Boys appraise the same injuries as less severe than girls (Hillier & Morrongiello, 1998) and may decide to engage in risk taking in spite of previous injuries. Research (e.g., Taimela et al., 1990) has indicated that boys are more likely to be injured in sport than girls. This finding parallels research in nonsport samples, which suggests that boys are two to four times more likely to be injured than girls (Wilson, Baker, Teret, Shock, & Gabarino, 1991). However, in a recent study of adolescent scholastic sport participants, Powell and Barber-Foss (2000) reported that girls actually incurred
significantly more injuries than males when specific same-sport, same-age comparisons of injuries were made (e.g., those of girls in soccer vs. those of boys in soccer).

The purpose of this study was to examine the predictive validity of perceived risk, risk taking, estimation of ability, overestimation of ability, and previous injuries on actual injury among adolescent sport participants. Sports represent a relatively controlled environment in which adolescents are, for the most part, free to make their own decisions to engage in risk taking and in which the consequences (e.g., injury) of their decisions are significant. A second purpose of this study was to examine sex differences among these factors in this population. The current study used the sport of soccer to examine sex differences because it offered similar competitive environments (e.g., rules, ball and field size, game duration) across different age groups for boys and girls.

Given the previous review of literature, we proposed the following correlational hypotheses:

1. perceived risk and risk taking would be inversely related to each other; 
2. risk taking would be positively related to injury; 
3. perceived risk would be inversely related to injury; 
4. estimation of ability and overestimation of ability would be positively related to risk taking; 
5. overestimation of ability would be positively related to previous injuries; and 
6. previous injuries would be positively related to injury.

Previous injuries were not expected to be related to higher risk-taking scores (Morongiello, 1997; Horvath & Zuckerman, 1993). From a predictive standpoint, it was anticipated that high levels of risk taking, low levels of perceived risk, and low levels of estimation of ability would be risk factors for injury in this sample. Sport participants who were previously injured were expected to incur more injuries than those who had not been previously injured. In regard to sex differences, boys were expected to report higher levels of risk taking, estimation of ability, and overestimation of ability; and lower levels of perceived risk. However, given the findings of Powell and Barber-Foss (2000), girls were expected to incur more injuries than boys in this same-sport comparison.

### Method

#### Participants
The participants were 260 adolescent soccer players (148 male, 112 female) between the ages of 11 and 14 years, with a mean age of 12.68 years (SD = .92). All of the soccer players in this study participated on same-sex, same-age teams against same-sex, same-age competition. Participants were recruited, on a voluntary basis, from 18 soccer teams representing two soccer organizations in central Michigan. The 260 participants in this study represented approximately 93% of the original players who were eligible and who were contacted for inclusion in this study. Attrition—due to family relocation, subject withdrawal, and declined parental or subject consent—accounted for the 7% of players from the original subject pool who did not participate in the study.

#### Measures

**Risk of Injury in Sport Scale (RISSc)**
A scale was previously developed to assess adolescent athletes’ perceived risk of injury across different contact or collision team sports (Kontos et al., 2000). The RISSc asked participants to indicate, on a scale of 1 (very unlikely) to 6 (very likely), how likely it was that they would be injured while participating in soccer. The 24 items of the RISSc represent a variety of injury-related events, such as “injure yourself in a collision with an opponent” and “be injured running into an object on the field.” The scale items comprise six factors:

- uncontrollable (U),
- controllable (C),
- overuse (O),
- upper body (UB),
- surface related (SR), and
- reinjury (R).

Using Cronbach's alpha, the internal consistency for the six factors in the current study ranged from .64 (R) to .82 (C).

**Risk-Taking Behaviors**
The nine-item Risk-Taking Behaviors Scale (RTB) was developed and evaluated by a focus group of soccer coaches, injury epidemiologists, and sport psychologists. The RTB asked participants to indicate, on a scale of 1 (never) to 4 (frequently), how often they would engage in each of nine risk-taking behaviors in soccer. The RTB consists of physical risk-taking (PRT), which includes physical contact-related behaviors (e.g., hard tackles); and skill risk-taking (SRT), which includes behaviors involving the performance of difficult soccer skills (e.g., diving headers). Using Cronbach’s alpha, the internal consistency of the two risk-taking factors for the current study was .71 (SRT) and .77 (PRT).
Estimation of Ability and Overestimation of Ability

Participants’ estimation of ability in soccer was assessed using a single question that asked participants to rate, on a 5-point Likert-type scale (1 = very low, 2 = low, 3 = average, 4 = high, 5 = very high), their “overall skill level in soccer compared to other players in their league of the same age.” Coaches were also asked to rate, using the same scale and question, each subject’s skill level at the beginning of the competitive season. Coaches conducted ratings of players’ skill levels after observing each player in at least three practices and one scrimmage. The coaches were familiar with the skill level of each player because most of the players in this study had played for, or in competition against, their current coach during the previous season. An overestimation-of-ability score was then derived for each participant by subtracting the coach’s rating of the player’s skill from the player’s rating. The overestimation-of-ability scores fell into one of three categories: overestimators (OE; positive score), accurately estimators (AE; score of zero), and underestimators (UE; negative score).

Previous Injuries

Before the start of the season, each athlete completed a personal history form to assess injuries that occurred in sport activities and in non-sport, play-related activities during the past 12 months. Participants were asked to report only those injuries that required medical attention or withdrawal from sport or other physical activity for more than one day.

Procedures

The University Committee for Research Involving Human Subjects approved this study. Upon approval from soccer administrators and coaches, separate meetings were held with each team to inform participants and their parents or guardians of the purpose of the study and to request their consent to participate. Completed, written informed-consent forms were subsequently collected from the participants and their parents or guardians.

The initial data-collection sessions occurred approximately 1 week before the beginning of each team’s competitive match season. At this time, the researcher administered the predictor measures: perceived risk, risk taking, estimation of ability, injury history, and demographic information. Ratings of participants’ soccer skills were concurrently obtained from coaches to determine participants’ overestimation of ability scores.

Prospective injury data from practices and matches were collected during the 8-week spring soccer season. During this time, an injury was recorded if incurred during a soccer match, or practice; and if it (a) kept the athlete out of the current match and any subsequent sport activities the day following the injury or (b) required medical attention or dental care beyond icing or wrapping. This definition precluded nuisance injuries, such as minor contusions, cuts, and blisters. The injury data were obtained from the coaches, who were contacted by phone three times per week during the period of the study. When an injury was reported, follow-up phone interviews were conducted with the injured athletes and their parents or guardians, to confirm injury information.

Results

Injury Data

A total of 21 participants sustained injuries during the study. The 21 injuries resulted in a total of 197 lost days. The breakdown of injuries included 12 for boys, 9 for girls. The most severe injury in the study was a fractured ankle that sidelined a participant for 56 days. Surprisingly, no participants incurred multiple injuries during the course of this study. Injury exposures were determined by summing the number of practices and matches, in which each participant took part. A total of 2,686 exposures were recorded: 1,552 match and 1,134 practice. The overall injury incidence rate was 7.8 per 1,000 exposures. The injury incidence rate for matches (12.9/1,000) was considerably higher than the rate for practices (0.88/1,000). The injury rates for girls (7.6/1,000) and boys (8.0/1,000) were comparable.

Correlational Analyses

A series of Pearson product moment correlation coefficients were calculated to assess the interrelationships among the predictor and outcomes variables in this study (see Table I). Surprisingly, perceived risk and risk taking were not inversely related to each other. Additionally, both a positive relationship between perceived risk and injury and an inverse relationship between risk taking and injury were not supported. As predicted, estimation of ability was positively correlated to risk taking. However, overestimation of ability was not related to risk taking. Both estimation of ability and overestimation of ability were positively related to previous injuries. Also as hypothesized, there was no relationship between previous injuries and risk taking. As suggested, previous injuries were not positively related to injury.
Case-Control Analyses

A series of case-control analyses were conducted on the perceived risk and risk-taking factors, estimation of ability, overestimation of ability, previous injuries, age, and sex in relation to injury status (i.e., yes or no; see Tables II and III for a summary of the results). An odds ratio (OR) of 1.00 indicates no association between the risk factor and injury. An OR greater than 1.00 indicates an increased likelihood of injury, whereas an OR of less than 1.00 indicates a decreased likelihood of injury. Based on the hypotheses proposed earlier, the low and average perceived risk and estimation of ability groups were compared to the high group score as the indicator factor (i.e., OR = 1.00; see Table II). The indicator factors for risk taking were the low groups; for overestimation of ability, the indicator factor was the UE group (see Table III).

Overall, the results indicated that lower levels of perceived risk and estimation of ability increased injury risk among participants in this sample. Specifically, the results indicated that participants with low levels of perceived risk (U, O, SR, and RI) were at significantly higher risk (ORs = 7.92, 3.77, 4.62, and 4.71, respectively) for injury than individuals with high levels of perceived risk. Similarly, participants with average levels of perceived risk (U, C, O, and SR) were at significantly higher risk (ORs = 4.21, 4.72, 6.10, and 3.39, respectively) for injury than individuals with high levels of perceived risk. Participants with low estimation of ability were 4.42 times more likely to be injured than participants

| Table I. A Summary of Correlations Among the Predictor and Outcome Factors |
|---------------------------------|---|---|---|---|---|---|---|---|---|---|---|
| Factor                          | EA | OE | PI | U  | C  | O  | UB | SR | RI | PRT | SRT | Injuries |
| Demographics                   |    |    |    |    |    |    |    |    |    |     |     |          |
| EA                             | —  | —  | —  | —  | —  | —  | —  | —  | —  | —   | —   | —        |
| OE                             | .41*| —  | —  | —  | —  | —  | —  | —  | —  | —   | —   | —        |
| PI                             | .24*| .24*| —  | —  | —  | —  | —  | —  | —  | —   | —   | —        |
| Perceived Risk                 |    |    |    |    |    |    |    |    |    |     |     |          |
| Uncontrollable                 | —  | —  | —  | —  | —  | —  | —  | —  | —  | —   | —   | —        |
| Controllable                   | .01 | —  | —  | —  | —  | —  | —  | —  | —  | —   | —   | —        |
| Overuse                        | .06 | .03 | .04 | .45*| .63*| —  | —  | —  | —  | —   | —   | —        |
| Upper body                     | —  | —  | —  | .16 | .41*| .55*| .38*| —  | —  | —   | —   | —        |
| Surface related                | .06 | .11 | .16 | .54*| .65*| .48*| .58*| —  | —  | —   | —   | —        |
| Reinjury                       | .06 | .04 | .17 | .53*| .49*| .41*| .52*| .64*| —  | —   | —   | —        |
| Risk Taking                    |    |    |    |    |    |    |    |    |    |     |     |          |
| Physical risk-taking           | .15*| .01 | .22 | .01 | .08 | .05 | .07 | .04 | .01 | —   | —   | —        |
| Skill risk-taking              | .36*| —  | .02 | .01 | .09 | .05 | .04 | .01 | .07 | .04 | .38*| —        |
| Injuries                       | —  | —  | .15 | .04 | .06 | .07 | .06 | .05 | .08 | .05 | .07 | —        |

EA = estimation of ability; OE = overestimation of ability; PI = previous injuries; U = uncontrollable; C = controllable; O = overuse; UB = upper body; SR = surface related; RI = reinjury; PRT = physical risk-taking; SRT = skill risk-taking.

*p < .05.

| Table II. A Summary of Odds Ratios (ORs) and 95% Confidence Intervals (CI) for Perceived Risk, Risk Taking, and Estimation of Ability and Injury |
|-----------------|--------|--------|--------|--------|--------|
| Risk Factor     |        |        |        |        |
| Perceived risk  |        |        |        |        |
| Uncontrollable  | 1.00   | 4.21*  | 7.92*  | —      |
| Controllable    | 1.00   | 4.72*  | 2.36   | —      |
| Overuse         | 1.00   | 6.10*  | 3.77*  | —      |
| Upper body      | 1.00   | 1.90   | 0.83   | —      |
| Surface related | 1.00   | 3.39*  | 4.62*  | —      |
| Reinjury        | 1.00   | 2.68   | 4.71*  | —      |
| Risk taking     |        |        |        |        |
| Physical risk-taking | 1.00   | 0.95   | 0.58   | —      |
| Skill risk-taking | 1.00   | 1.37   | 0.48   | —      |
| Estimation of ability | 1.00   | 5.46*  | 4.42*  | —      |

* p < .05.
with high estimation of ability. Participants with average estimation of ability were 5.46 times more likely to be injured than participants with high estimation of ability. The risk-taking, overestimation-of-ability, previous injuries, age, and sex factors were not associated with an increased risk of injury. Due to the sex differences in some of the predictor factors discussed in the following section, separate ORs were calculated for boys and girls. The results indicated no significant differences in the ORs for boys and girls for any of the risk factors.

**Sex Comparisons**

MANOVAs were used to assess sex differences on three sets of predictor factors: perceived risk (RISSc); risk-taking (RTB); and demographic (estimation of ability, overestimation of ability, previous injuries, and age). Both the perceived risk (Wilks’s Λ = .82, $F[6, 241] = 8.57, \eta^2 = .18, p < .01$) and risk-taking (Wilks’s Λ = .93, $F[2, 245] = 9.29, \eta^2 = .07, p < .01$) MANOVAs were significant. As expected, boys reported significantly higher levels of risk taking and lower levels of perceived risk than girls, although the effect sizes were small (ES range = .03–.14). Results of the demographic MANOVA indicated that boys and girls reported similar levels of estimated ability and overestimation of ability. From a descriptive perspective, 30% of girls were OEs, whereas only 27% of boys were OEs. Surprisingly, 39% of boys, compared to 35% of girls, were UEs. No sex differences were found for previous injuries or age. An independent t test comparing boys and girls on injury number revealed no significant difference. Separate correlations for boys and girls mirrored those reported earlier for the overall sample. A standard discriminate function analysis was conducted to assess the utility of the predictor factors in classifying participants by sex. The results of the analysis indicated that two predictors—perceived risk and risk taking—correctly classified 67.2% of the participants as male (63.7% correct) or female (71.6% correct).

### Discussion

The case-control analyses indicated that low perceived risk and low estimation of ability were significant risk factors for injury. In fact, participants with a low perception of U risk were nearly eight times more likely to be injured than participants with a high perception of U risk. These differences were also generally supported for participants with average levels of perceived risk. Conversely, with regard to which factors decrease injury risk, these findings suggest that a high perceived risk and a high estimation of ability may act as protective factors from injury. The results support previously reported protective effects of high perceived risk in regard to the consequences (i.e., injury) of risk taking (Cook et al., 1999). Participants with low estimations of ability and average estimations of ability were, respectively, 4.4 times and 5.5 times more likely to be injured than those with high estimations of ability. The current findings regarding estimation of ability are in contrast to those of Schwebel and Plumert (1999), who suggested that low estimations of ability may help children avoid injury. However, the current finding supports the hypothesis that sport participants with low estimations of ability will have a greater likelihood of a negative outcome, such as injury (Bandura, 1997). Sport participants with low estimations of ability may demonstrate high skill in sport but may lack confidence in their skills. Thus, they create a climate wherein difficult and risky skills are attempted without a concomitant belief in a successful outcome. However, estimation of ability was positively related to risk taking, particularly risk taking that involved difficult and potentially injurious skills (i.e., SRT). According to social–cognitive theory, sport participants with high estimations of ability in a particular sport context are more likely to attempt new or difficult skills than are sport participants who have lower estimations of ability (Bandura, 1997). As such, the findings in relation to estimation of ability and risk
taking lent support to this contention. However, increased risk taking did not translate into a greater incidence or risk of injury. Hence, a low estimation of ability may increase one’s injury risk in sport directly. Given the difficulty in ascertaining causation, as well as the correlational nature of some of the analyses in this study, it is also possible that multiple injuries eroded subsequent estimations of ability.

The hypothesized negative relationship between perceived risk and risk taking was not supported by the results of this study. Perceived risk may not be negatively related to risk taking unless it is specific to each risk-taking behavior. The findings may also reflect the lack of a relationship in this population, but they may also be a consequence of the use of self-reported risk taking and the very few injuries reported in this study. As hypothesized, estimation of ability was positively related to risk taking. This finding supports the notion that athletes who are confident in their abilities in sport are more likely to engage in calculated risk taking (Bandura, 1997).

The findings of the present study indicate that previous injuries are unrelated to risk taking and perceived risk but are positively related both estimation of ability and overestimation of ability. The latter finding suggests, as predicted, that some adolescent sport participants maintain high or inflated levels of estimation of ability in spite of previous injuries or that they are injured more often, due to their confidence. The result concerning estimation of ability is also contrary to Bandura’s suggestion (1997) that past experiences (i.e., injury) will negatively influence subsequent levels of estimation of ability. However, the current study did not qualitatively examine the effects (positive or negative) of specific previous injuries, thus making it difficult to ascertain the impact of previous injuries. The past injuries reported by participants may have been minor or may have been resolved successfully, thus increasing estimation of ability. Morrongiello (1997) indicates that children tend to avoid repeating only those behaviors that lead to more severe injury outcomes.

In the current study, boys reported significantly higher levels of perceived risk than girls. This finding may reflect a real difference in perceived risk between girls and boys. The magnitude of these relationships, though, was relatively low (ES range = .04–.14). Girls may be more accurate than boys in assessing risk in sport. Additionally, it may be socially desirable for boys to perceive less risk in sports, in accordance with the prevailing masculine stereotype for boys in sports (Coakley, 2001). Brustad (1993) has suggested that boys tend to underreport anxiety levels because it is socially desirable to do so or because it retains self-confidence. Similar logic could be applied to the current findings in suggesting that boys underreported their levels of perceived risk, whereas girls were accurate in their reporting. Another factor that may have influenced this finding is the socialization process of girls into sport. Parents and coaches have traditionally socialized female sport participants away from the aggressiveness, physical contact, and risk taking that are considered necessary in contact sports such as soccer.

Sex differences were apparent in self-reported risk taking, although again the magnitude of these differences was relatively low (ES range = .03–.07). Boys reported engaging in more risk taking than girls. This finding supports the work of Morrongiello and Rennie (1998), who also reported that boys engaged in significantly more risk taking than did girls. This sex difference may be reflective of the fact that boys engage in more risk taking behaviors in sport than girls. In support of this contention, Morrongiello and Rennie (1998) found that boys tended to attribute injuries more to luck and were more optimistic regarding positive outcomes related to taking risks. Hence, with regard to their potential for injury, boys may believe it inconsequential whether they engage in risk-taking behaviors or not.

Contrary to subjects of previous research (Lirgg, 1991), boys and girls in the current study reported similar estimation of ability and overestimation of ability. This finding may be a reflection of an increasingly positive self-perception among girls in sport resulting from a greater societal acceptance of women in sport (Coakley, 2001). This is particularly plausible in the current study, as the girls and boys participated in the same sport, under the same rules and conditions, negating the influence of sport type and environment on sex differences. The result regarding overestimation could reflect similarities between boys and girls in their accurately rating their own abilities, or it could reflect inherent bias of the use of coach ratings as the comparison score for determining overestimation. Most of the coaches of both the boys’ and the girls’ teams were male. Male coaches may be more likely to rate boys higher and girls lower in skill, resulting in artificially high levels of OE girls and UE boys. Boys and girls also did not differ in injuries. This finding represents a middle ground between the comparatively higher injury rates for girls than boys reported by Powell and Barber-Foss (2000) and research that has suggested that boys are more likely to be injured than girls (Taimela et al., 1990; Wilson et al., 1991). The negligible OR for sex in the current study
was considerably lower than the 2.27-fold increased (though nonsignificant) risk for boys as reported in previous research (Jaques & Finney, 1994). These equivocal results indicate that there is more to sex differences related to injury in sport than simply the sex of the participants.

There were several limitations to this study, the most salient of which was the low number of injuries reported. Although the low number of injuries in this study indicates that soccer was not a particularly hazardous activity among participants in this sample, it limits the utility of this study's findings regarding injury risk. Future research on predictors of youth sport injury should involve a longer prospective study duration, or it should utilize sport samples with a higher likelihood of injury, such as American football, hockey, or rugby. Another limitation of this study is in its inability to determine the causal link between the predictor factors and injury. It is possible that predictor factors, such as perceived risk and estimation of ability, influence subsequent injury outcomes, but it is equally likely that injury influences subsequent perceptions of risk and estimation of ability. Hence, the predictor factors in this study must be viewed in terms of their relationship to, rather than their causal effect on, each other and injury. In addition, participants’ risk taking in this study was measured using self-report items, which may or may not reflect actual risk taking in sport environments. The earlier referenced social desirability among boys and socialization into sport among girls may have affected the validity of the risk-taking self-reports and the reported sex differences. The current study used a single item to measure estimation of ability. This approach may have limited the validity of the estimation of ability measures. Multiple-item measures of estimation of ability, or self-efficacy, may offer a more valid measure of these constructs. Lastly, the use of coaches’ assessments of players’ abilities may have resulted in a bias in determining overestimation, as coaches may not be an objective source of estimations of player abilities. As mentioned earlier, they may also perceive boys and girls abilities differently. Specifically, coaches may be as likely to over- or underestimate player abilities as players are. To minimize this limitation, future studies should use an observable estimation of ability in sport, such as those used by Schwebel and Plumert (1999). Moreover, the distinction between OE, AE, and UE groups was minimal and may not have accurately reflected true differences in estimations of ability.

This study revealed that low levels of perceived risk and estimation of ability resulted in a significant increase in injury risk. This finding suggests that behavioral interventions designed to educate youth sport participants, coaches, and parents about the risks associated with sport participation (e.g., playing without proper protective equipment) and about the environmental manipulations that promote the development of self-confidence in sport (e.g., success-focused learning environment) may lead to a reduction in injury risk. In regard to sex differences, girls reported higher perceptions of risk and engaged in less risk taking than boys. However, girls and boys reported similar estimations of ability, indicating that the socialization of girls who participate in sports may closely mirror that of boys in sport, more so than previously suggested. Boys reported taking risks in spite of previous injuries. In contrast, girls’ previous injuries were positively related to injury. Future research should address the limitations of the current study and focus on the factors influencing sex differences in perceived risk, risk taking, and the effects of previous injuries, including social desirability, socialization, and risk attributions.

Received April 18, 2003; revisions received August 4, 2003, and November 18, 2003; accepted December 15, 2003

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