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Optimism in Children's Judgments of Health and Environmental Risks

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Although optimistic bias has been well documented for adults, little is known about how children view their own risks vis-à-vis those of their peers. Two studies of 6th graders examined optimism and the degree of differentiation in perceived risks across diverse health, lifestyle, and environmental problems. The findings revealed perceptions of relative invulnerability and highly differentiated risk assessments. The strongest levels of optimism emerged for controllable and stigmatizing events such as illicit drugs, smoking, and AIDS. The effects of gender, assessment context, and methodological variations were minimal. Discussion focused on the implications for health-promoting interventions with school-age children, the need for developmental information about risk perception processes, and the difficulty of distinguishing realistic from biased optimism.

Key words: optimism, risk perception, children, AIDS, perceived control, vulnerability

People are basically optimistic. A large and diverse body of literature attests to the fact that most people, under most conditions, view their own chances of misfortune as lower than those of other people (e.g., Adler, Kegeles, & Genevro, 1992; Gladis, Michela, Walter, & Vaughan, 1992; Kirscht, Haefner, Kegeles, & Rosenstock, 1966; Kulik & Mahler, 1987; Quadrel, Fischhoff, & Davis, 1993; Weinstein, 1988). This pervasive phenomenon has been variously labeled *optimistic bias, unrealistic optimism, positive illusion,* or *unique invulnerability* because of the logical impossibility that everyone's risks are lower than those of everyone else.[1] Such perceptions of relative invulnerability have been found across a wide range of diseases, hazards, and catastrophic events (e.g., automobile accidents, heart attacks, AIDS, and criminal victimization). Moreover, perceived invulnerability occurs not only in people who are thought to be relatively immune but also in those considered at high risk (Gerrard, Gibbons, & Warner, 1991). A number of cognitive and motivational processes have been identified as potential shapers of self-perceived invulnerability—including cognitive errors, selective attentional focus, egocentrism, self-esteem enhancement, and fear avoidance (Dolcini et al., 1989; Gerrard et al., 1991; Perloff & Fetzer, 1986; Weinstein, 1988).

Despite the high research density with adults, very little is known about how school-age children perceive risks and hazards and whether they, too, judge themselves to be luckier or less vulnerable than their peers. Today's children are bombarded by warnings and reminders about a broad array of serious health and environmental hazards. We know that children worry, about everyday hazards as well as catastrophic events (e.g., Ollendick, King, & Frary, 1989; Orton, 1982; Whalen et al., 1994), but we do not know how serious or how proximate they perceive these risks to be. Perhaps more important, there is a lack of information on whether and how children distinguish among the multifarious dangers confronting them.

Programs aimed at promoting heart-healthy habits and preventing cigarette smoking are commonplace, and in many school districts educational interventions for elementary-school children have been mandated to help prevent serious problems such as child sexual abuse or AIDS. Unfortunately, these programs are being forged and launched without adequate knowledge of how children process information and make risk-related judgments. Age-specific understanding of children's comparative risk judgments is important not only for the formulation of intervention programs but also because, at least in adults, risk perceptions have been linked to risky actions. In a study of contraceptive use, for example, Burger and Burns (1988) found that higher levels of optimistic bias regarding the probability of experiencing unwanted pregnancy were associated with lower rates of effective contraception. Risk perceptions may also be linked to behavioral intentions, as illustrated by a recent report that high school students' perceived vulnerability to AIDS was associated with their intentions to change risk-promoting behaviors (Gladis et al., 1992).

The two studies reported here were designed as a first step toward filling gaps in our knowledge of children's risk perceptions. One goal was to determine whether children, like adults, perceive themselves as relatively invulnerable to health and environmental risks. A related goal was to assess the degree of differentiation in children's risk judgments across an array of health and environmental hazards.

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[1] The term *optimistic bias* has been used to refer to a generalized tendency to perceive one's own risks as lower than those of other people. To be consistent with the literature, we use this term here to refer to perceptions of relative invulnerability. Note, however, that in many cases such perceptions are more accurate than illusory and that the bias may be a realistic one.

Do children hold global risk perceptions for themselves versus their peers, or do they discriminate among various health and environmental hazards, incorporating their own knowledge and experiences in a considered, risk-specific manner? A third and final goal was to examine the robustness of risk perception patterns and their degree of sensitivity to methodological variations.

Grade 6 was selected as the focus because late childhood is perceived as a critical transitional time for the development of health habits (Cohen, Brownell, & Felix, 1990). Also, sixth-grade children are on the threshold of adolescence, a time when the health and safety consequences of unrealistic optimism intensify as autonomy increases and risky behaviors accelerate (Crockett & Petersen, 1993; Dolcini et al., 1989; Jessor, 1984; Perry, Klepp, & Shultz, 1988).

Each study compared judgments of self-vulnerability (SV) with judgments of other-vulnerability (OV) across problems related to health, lifestyle, and the environment. Study A used a group-administered questionnaire that asked students to indicate the likelihood that they themselves, and the likelihood that students like them, would be affected by specified health and environmental events. Study B asked similar questions by means of a private interview format. Differences in the framing of the comparisons and in the interpersonal context of the assessments also distinguished the two studies, as detailed in the following paragraphs.

Study A

Method

Participants. The participants were 244 sixth-grade children (121 girls and 123 boys) ranging in age from 10 to 13 years. These students, most of whom were White, were enrolled in public elementary schools in middle-income neighborhoods in southern California.

Measure. For each of 19 events, children were asked to estimate their own risk (SV) as well as that of other people their age (OV). The events were clustered into three domains: health, lifestyle, and environment. Events were selected on the basis of relevance and familiarity; they were problems that students are likely to confront either directly (personally) or indirectly (through social or media exposure). The goal was not only to identify prevalent and relevant problems but also to include both chronic and acute difficulties that covered the spectrum from relatively minor to severe. An attempt was made to include, in each of the three domains, one highly prevalent and nonstigmatizing event that would not be expected to generate strong optimistic bias. These events, which served as informal benchmarks, were flu (health domain), stress (lifestyle domain), and air pollution (environmental domain).

The events were pretested to ensure comprehension. The final set included six disease–injury (health) items (cancer, heart attack, AIDS, broken bone, allergies, and flu), six lifestyle behaviors (use illicit drugs, drink too much alcohol, smoke cigarettes, eat too many unhealthy foods, not get enough exercise, and have too much stress), and seven physical and social environmental hazards (air pollution, acid rain, a big earthquake, fire, chemicals or pesticides in food, toxic waste, and shootings or gang violence).

For each event, children estimated SV by answering the question, "What are *your* chances? Will this happen to you?" The OV question asked, "Think of *other* people your age. What are the chances this will happen to a typical person?" Each event was presented twice on a single page, once for the SV and once for the OV question. A 10-point scale was provided in the form of a 10-1/2-in. "ruler" divided into 10 equal boxes. The endpoints were labeled *will not happen* and *will happen*, and the anchors on either side of the midpoint were *might not happen* and *might happen*. The students were instructed to "mark an X in the box that tells us what you think the chances are that. . . ."

The 19 problems were arranged in one of four random orders and presented in response booklets. Order of self- and other-judgments was fixed for each child but counterbalanced within each classroom so that half of the children always made OV judgments first and half always estimated SV first. In other words, children were randomly assigned to one of four problem orders, and approximately half in each order judged OV and then SV, whereas the other half judged SV first and then OV.

Procedures. Administered in school classes, the questionnaire took about 15–20 min to complete. A trained graduate student gave instructions while another research staff member helped with materials and answered questions. Teachers and other school personnel did not participate in the study. The students were assured that their responses were confidential and anonymous, and they were asked not to put their names on their questionnaires.

The list of events was read aloud before the questionnaires were distributed, and students were encouraged to ask questions if any of the terms were unclear. Standard definitions were provided on request, but these requests were rare. For practice with the rating scale, the children began by indicating their chances of a relatively common event (being at a ball game on a day the home team wins) and a relatively uncommon event (finding a $5 bill on the way home from school).

Results

Responses were multiplied by 10 to create 100-point scales. The data were then analyzed in a $2 \times 2 \times 2$ mixed multivariate analysis of variance (MANOVA) design. There was one within-subject factor, other–self or optimism, which contrasted estimates of OV and SV. The other two factors were between subjects: gender and order (SV–OV versus OV–SV). Separate MANOVAs were conducted for each of the three clusters (health, lifestyle, and environment), and significant findings were followed by univariate tests for individual problems. Because of the large sample size and number of separate analyses, alpha was set at .01 rather than the more typical .05, and findings that fell between .01 and .05 were considered of borderline significance.

Optimism, gender, and order effects. These young people are clearly optimistic about their own vulnerabilities compared with those of others. As can be seen in Table 1, children estimated their own chances of confronting a wide array of health and environmental problems as substantially lower than the chances of other children. Significant optimism emerged for all three clusters: $F(6, 233) = 51.33$ for health problems, $F(6, 233) = 103.56$ for lifestyle problems, and $F(7, 231) = 30.88$ for environmental problems, all $ps < .001$. Univariate tests indicated comparative optimism for all health problems except flu, for all lifestyle problems except stress, and for all seven environmental problems. There were no significant gender or order effects, and none of the interactions reached significance.

Differential degrees of optimism. Within a context of pervasive optimism, these young people were relatively discriminating in their specific judgments. For each of the three clusters, the Tukey method of multiple comparisons was used to delineate significant differences across events in degrees of optimism. Honestly significant differences (HSD) were calculated to identify the minimum significant difference between pairs of events, and these figures are presented in Table 1. For the health cluster, the children were most optimistic about AIDS and least optimistic about flu; ratings of AIDS were significantly higher, and those of flu significantly lower, than those of all other health problems. In addition, less optimism was expressed regarding broken bones than either heart attacks or cancer. The lifestyle cluster revealed a clear distinction between stigmatic or illicit problem behaviors (cigarette smoking, drugs, and alcohol) and more mundane health threats (unhealthy foods and stress). Differentiation within the problem behavior cluster also occurred, with

Table 1
Perceived Vulnerability: Judgments for Self Versus Similar Others

Variable	Study A			Study B		
	Other rating	Self-rating	Diff (O − S)[a]	Other rating	Self-rating	Diff (O − S)[b]
Health						
AIDS						
M	50.0	27.4	22.6	48.0	23.1	24.9
SD	21.6	17.2		26.2	18.6	
Heart attack						
M	54.2	40.1	14.1	54.6	41.0	13.6
SD	21.9	21.3		24.5	25.5	
Cancer						
M	52.8	39.6	13.2	49.4	34.5	14.9
SD	19.4	19.3		23.4	23.0	
Allergies						
M	69.2	58.9	10.3	78.1	67.1	11.0
SD	19.3	31.4		22.2	35.8	
Broken bone						
M	70.9	64.3	6.6	83.2	76.6	6.6
SD	16.5	21.1		16.6	24.9	
Flu						
M	87.2	85.7	1.5	88.4	84.7	3.7
SD	17.0	19.5		18.8	23.3	
Lifestyle						
Smoke cigarettes						
M	60.7	26.7	34.0	61.1	20.4	40.7
SD	20.5	23.3		28.7	21.6	
Take (illicit) drugs						
M	51.4	18.5	32.9	49.9	16.0	33.9
SD	22.4	16.5		28.2	14.8	
Too much alcohol						
M	57.2	28.4	28.8	53.2	24.3	28.9
SD	21.4	22.6		28.1	22.7	
Too little exercise						
M	58.5	35.5	23.0	58.6	35.1	23.5
SD	19.8	26.8		25.2	26.9	
Unhealthy foods						
M	71.2	56.4	14.8	75.6	60.5	15.1
SD	18.2	25.7		22.8	28.5	
Too much stress						
M	69.8	67.3	2.5	73.0	68.2	4.8
SD	19.6	25.1		26.0	26.7	
Environment						
Gang violence						
M	53.9	39.3	14.6	52.2	34.2	18.0
SD	20.3	22.2		24.6	24.8	
Fire						
M	58.1	47.1	11.0	57.1	51.2	5.9
SD	18.9	18.2		22.3	22.7	
Toxic waste						
M	49.5	40.7	8.8	51.7	43.1	8.6
SD	21.4	22.1		26.0	26.1	
Chemicals in food						
M	56.7	48.0	8.7	54.7	48.8	5.9
SD	19.0	20.2		24.1	25.7	
Acid rain						
M	51.2	42.8	8.4	48.4	43.1	5.3
SD	22.1	23.2		28.6	27.5	
Air pollution						
M	64.8	59.8	5.0	72.6	69.0	3.6
SD	21.5	24.4		22.9	27.1	
Big earthquake						
M	66.5	63.9	2.6	63.6	68.9	−4.7
SD	18.9	20.8		24.6	23.4	

Note. Diff = difference.
[a]Required honestly significant differences (HSDs) for interitem comparisons = 4.88, 5.21, and 3.65 for health, lifestyle, and environmental problems, respectively.
[b]Required HSD for interitem comparisons = 11.29, 10.77, and 10.02 for health, lifestyle, and environmental problems, respectively.

students more optimistic about refraining from cigarette smoking than about avoiding excessive alcohol intake. For the everyday triad, insufficient exercise elicited the greatest amount of optimism and stress the least, with unhealthy foods falling midway between these two and differing significantly from both. The environmental cluster reflected the demographic makeup of the sample, with the problems endemic to southern California (air pollution and earthquakes) eliciting the lowest levels of optimism.

To portray these differential levels of optimism across problem domains, relative risk ratios were computed for each problem by dividing the OV by the SV estimate for each respondent. The resultant value reflects other peoples' chances relative to one's own chances, with 1.0 representing zero difference and progressively higher numbers representing increasing levels of optimism. These indexes are presented graphically in Figure 1.

Study B

As noted, Study B compared judgments of SV with judgments of OV across the same set of health, lifestyle, and environmental problems presented in Study A. Study B involved a new sample of students, used a private interview rather than a group questionnaire format, and also varied the framing of the comparisons, as detailed below.

Method

Participants. Seventy-three sixth-grade students, 39 girls and 34 boys, participated. None of these children had been involved in Study A. These youngsters were attending schools in the same neighborhoods as those who participated in Study A, and they were comparable in age, ethnicity, and family income level. Before their participation, all students had returned signed parental consent forms and given their verbal assent as well.

Measure and procedures. An interview protocol that focused explicitly on SV and OV was developed to parallel the questionnaire used in Study A. Using the same four event orders delineated for Study A, we randomly assigned each child to one event order for SV and to a different event order for OV. The full set of events was rated along one dimension and then along the other dimension, with the SV–OV order counterbalanced.

These 20-min interviews were conducted in a private setting at school. The children were told that the interviewer was interested in their opinions about different things that happen to people and to the environment. They were assured that there were no right or wrong answers and that their responses would be confidential.

A ring with a 2-in. human figure attached to it was placed in the middle of a rod so that it could slide in either direction. The figure was portrayed as representing either a typical person (OV) or the student (SV). For SV, the children were asked to "pretend that this person is *you.* When I read one of the cards to you, tell me how likely it is that it will happen to you sometime during your life, any time from now on." For OV, the children were asked to "pretend that this figure is someone else just like you—just a typical person your age. When I read one of the cards, think of other people like you in the United States and tell me how likely you think it is that it will happen to a typical person sometime during his or her life, any time from now on."

The interviewer situated the marker at the center of the rod before reading each event, and the student moved the marker as far as desired to the left to indicate that the event *will not happen* or to the right to indicate that it *will happen.* Practice items were used to ensure understanding, and none of the students had difficulty with the task. The three-dimensional rod used here was comparable to the paper-and-pencil ruler used in Study A. The rod was 10 in long, and every inch was marked with a strip of tape to help students gauge their responses. No numbers were visible to the students, however. The numbers were placed on the back of the rod, and position was recorded unobtrusively, in half-inch increments, by the interviewer.

There were several methodological differences between the two studies. In Study A, students rated both SV and OV for each event before proceeding to the next event. In contrast, participants in Study B went through the entire list of 19 events rating just one of the vulnerability dimensions, either self or other, and then went through the list again and rated the other vulnerability dimension. Two other differences between the studies were that Study B involved a face-to-face interview rather than a questionnaire and that it used a three-dimensional visual analogue device rather than a paper-and-pencil rating instrument. A slight wording difference in the instructions should also be noted, because it could serve to make Study B the more stringent test of relative optimism. In Study A, the comparison target was identified as "a typical person your age," whereas the Study B instructions added the phrase "another person just like you." These differences in assessment mode, response format, sequencing, and target comparison were designed both to enhance the generality of the findings and to identify sources of methodological specificity.

Results

Once again, the basic design was a 2 (self vs. other judgments) × 2 (self–other order) × 2 (gender) MANOVA. As in Study A, separate MANOVAs were conducted for each of the three clusters, and significant findings were followed by univariate tests for individual problems. Means and standard deviations appear in Table 1.

Optimism, gender, and order effects. As in Study A, the MANOVAs revealed significant other–self (optimism) main effects for each cluster, indicating substantial degrees of optimism: $F(6, 64) = 15.50$ for health problems, $F(6, 64) = 27.35$ for lifestyle problems, and $F(7, 63) = 7.93$ for environmental problems, all $ps < .001$. Individual ANOVAS for the health cluster indicated optimism for AIDS, cancer, and heart attack and borderline findings for allergies and broken bones. As expected, no self–other difference emerged for flu. Optimism was also found for all of the lifestyle problems except stress and for two of the environmental items: gang violence and toxic waste. Borderline effects ($.05 > p > .01$) were found for stress and for all of the remaining environmental items except air pollution. Note, however, that the effect for earthquakes was in the pessimistic direction, as might be expected for children from southern California.

There were no significant main effects of gender or order. There was, however, a borderline finding for gender in the environmental cluster, $F(7, 63) = 2.39$, $p < .05$, reflecting higher risk estimates for gang violence among boys than girls, $F(1, 69) = 8.71$, $p < .01$. There was also a significant Optimism × Order interaction within the lifestyle cluster, $F(6, 64) = 3.54$, $p < .01$. Although none of the univariate interactions reached significance, borderline findings suggest a greater degree of optimism for alcohol and drug use when the children estimated their own risk before that of others and suggest the opposite trend for the consumption of unhealthy foods. Finally, a borderline three-way interaction for the health cluster, $F(6, 64) = 2.43$, $p < .05$, reflects a single univariate effect for cancer, $F(1, 69) = 7.97$, $p < .01$; this finding is likely due to chance and thus will not be interpreted.

Differential degrees of optimism. Once again, Tukey tests were conducted to identify significant differences across events in degrees of optimism, and relative risk ratios are presented in Figure 1. The overall pattern was quite similar to that found in Study A. For the health cluster, the optimism level for AIDS was significantly higher than those for all other items except cancer. The lifestyle cluster

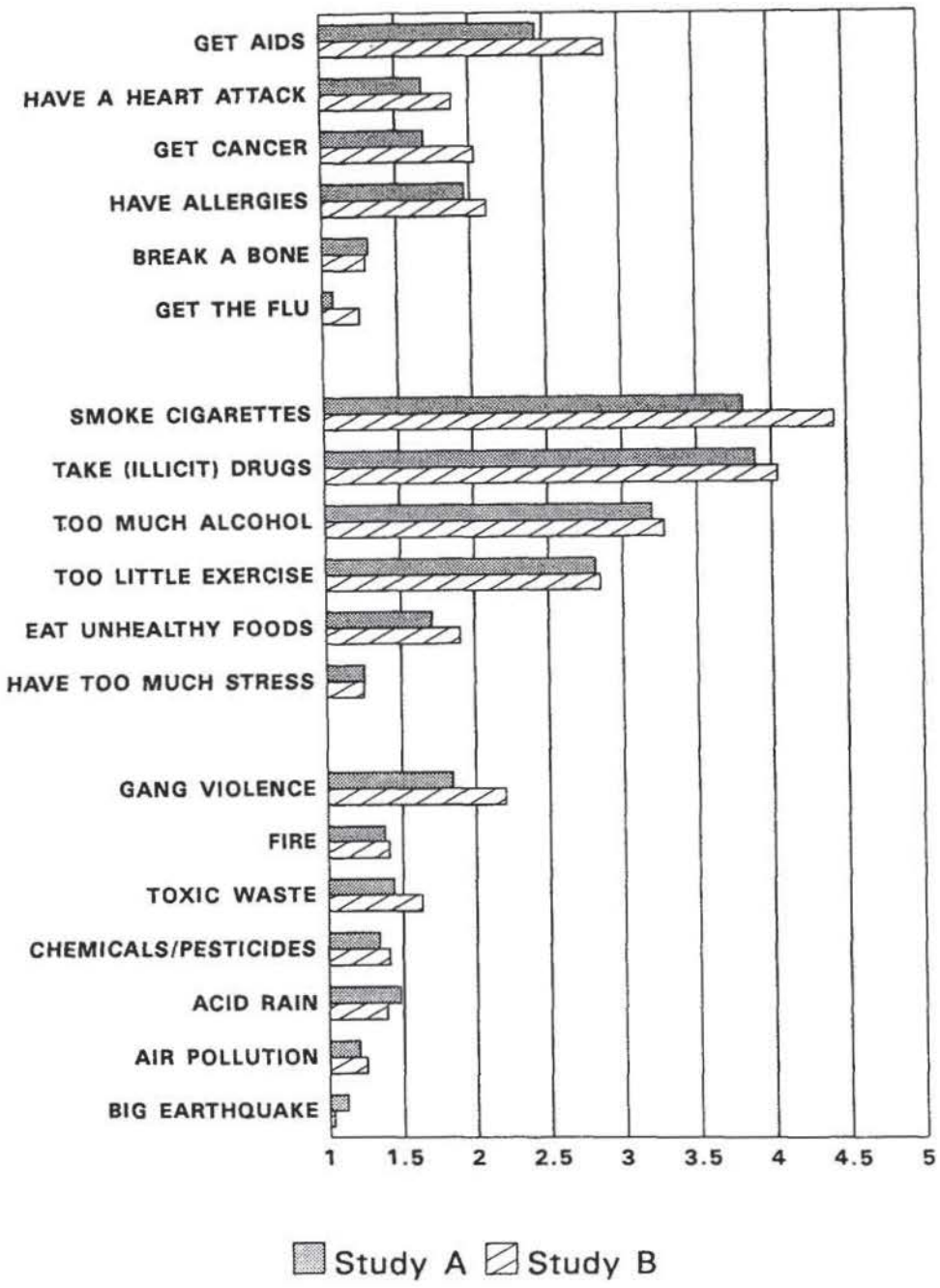

Figure 1. Children's perceptions of relative risk: assessments of other-vulnerability versus self-vulnerability.

again revealed differences between the more serious problem behaviors (cigarette smoking, drugs, and alcohol) and the milder health-compromising experiences (unhealthy foods and stress). For the environmental cluster, significantly more optimism was expressed for avoiding gang violence than for most of the remaining items.

Comparisons across the two studies. Although there were several fundamental methodological differences between the two studies, the results were remarkably similar. Both studies revealed substantial degrees of optimism overall as well as similar patterns of differentiation across the events. Indeed, the rank order correlation for degree of optimism across the two studies was .96. Moreover, the five events generating the greatest self–other discrepancies were identical across the two studies, as were the rank orders. From most to least optimism, these events were smoke cigarettes, take (illicit) drugs, drink too much alcohol, get AIDS, and not get enough exercise.

Links between relative vulnerability and perceived control. In a separate study, another group of sixth-grade students was asked to judge the seriousness, prevalence, and controllability as well as their personal vulnerability to the same set of events. These dimensions

were assessed because of their documented contributions to adults' risk perceptions (e.g., Vaughan, 1993). Although a complete presentation of these findings is beyond the scope of this article, we present the intercorrelations between optimism levels and these other dimensions in an attempt to identify potential mediators of optimistic reasoning. Spearman rank order correlations were used to examine the associations between degree of optimism indicated in the present studies and judgments of personal control, seriousness, prevalence, and vulnerability made by same-age children in the earlier study (N = 78). As expected, the validity of the present measures was confirmed by hefty inverse correlations between optimism and previous ratings of vulnerability, $rs(17) = -.78$ and $-.71$, $ps < .001$, for Studies A and B, respectively. More interestingly, optimism was solidly associated with perceived control, $rs(17) = .71$ and $.75$, $ps < .001$, suggesting that events that elicit perceptions of high self-efficacy are also those viewed as more problematic for others than for oneself. There was no association between relative optimism and judgments of either the seriousness or the prevalence of these events.

Discussion

The pattern of findings across the two studies indicates quite clearly that children perceive their own risks as substantially lower than those of their peers. These findings are similar to those obtained previously with adults (e.g., Kirscht et al., 1966; Kulik & Mahler, 1987; Weinstein, 1988), indicating substantial levels of optimism across a wide array of health and environmental hazards. Although direct comparisons with previous studies of adults cannot be made, recent reports that adolescents and their parents make similar risk assessments strengthen the hypothesis of cross-age comparability (Millstein, 1993; Quadrel et al., 1993). The rarity of gender differences was also consistent with results from adult studies. Especially notable was the differentiation in levels of optimism across the array of health and environmental hazards. Likelihood of personal experience was associated with lower levels of optimism and perceived control with higher levels, findings that replicate previous data from adults (Adler et al., 1992; Weinstein, 1982, 1984). The overall pattern attests to the discerning nature of children's risk perceptions, suggesting that their optimism may be more realistic than illusory.

Despite these apparent similarities between children and adults, comparisons must be treated cautiously for two reasons. First, adults were not included in the present studies, and none of the previous work with adults involved measures identical to those used here. Second, adult–child similarity in relative risk judgments does not necessarily imply similarity in the processes underlying these judgments. We do not yet know whether children's risk reasoning approximates that of adults or whether there are age-specific cognitive and motivational mediators. It is possible, for example, that experiential and cognitive limitations are more important determinants of optimism in children, whereas motivational processes have a greater impact on adult judgments.

In interpreting the self–other judgments that emerged in the present studies, it is important to focus on the relative rather than the absolute values. The scale was not designed to elicit actual probability estimates, and in fact no numbers appeared on the instruments presented to the children. Thus it would be incorrect to conclude, for example, that the children expect about half of their peers to develop AIDS or to suffer from gang violence (see Table 1).

There were several fundamental differences in the methodologies of the two studies that could potentially influence the findings. One might expect, for example, that the pairing of self- and other-judgments for each event, as was done in Study A but not in Study B, would make the contrast especially salient and thereby increase the degree of optimism shown. One might also expect more thoughtful answers as well as greater concerns with social desirability in personal interview than in anonymous group contexts. Given the multiple reasons to expect that the procedural differences would have an impact, the similarity in the results of the two studies seems especially noteworthy.

These demonstrations that children feel that they are uniquely unlikely to engage in or suffer the consequences of risky behaviors have immediate practical implications and also suggest important directions for further empirical inquiry. Recent evidence of little change in AIDS risk perceptions before and after Earvin Magic Johnson announced that he was HIV positive (Sigelman, Miller, & Derenowski, 1993; Whalen et al., 1994) reminds us that vicarious experience cannot be expected to lead spontaneously to attitude change. Even so, perceptions of personal and population vulnerability would seem readily malleable as long as experiences, observations, and knowledge are incorporated systematically into health promotion programs. Our technologies for attitude change, however, outstrip our abilities to identify optimal levels of personal concern and worry and thus to pinpoint potential targets for preventive intervention. Children who perceive little risk are unlikely to adopt health-protective behaviors, an assumption buttressing the value of fear-induction tactics when dealing with life-threatening outcomes such as AIDS. But children who perceive risks to be overwhelming and beyond their coping abilities may be equally unlikely to engage in health-protective actions. Moreover, an optimistic outlook often has salutary consequences, as demonstrated in studies of health and coping in adults (e.g., Scheier & Carver, 1993; Taylor & Brown, 1988).

A study by Terre, Drabman, and Meydrech (1990) illustrates the relative independence of specific health behaviors and also documents developmental shifts in the organization of health habits through late childhood and adolescence. Although these investigators focused on self-reported behaviors rather than on cognitive and affective processes, it can be assumed that the optimal levels of perceived vulnerability will also vary across risks and developmental phases. Individual differences also play important roles, as demonstrated by Gladis et al.'s (1992) report that personality style interacted with actual behavioral risk in predicting high school students' AIDS risk perceptions.

In summary, personal vulnerability judgments can be viewed as the tip of an iceberg of cognitive and motivational processing, and both risk-specific and person-specific knowledge is needed before these findings can be incorporated into preventive interventions. Moreover, age-specific developmental information is needed on the cognitive and emotional processes that mediate optimism—both realistic and unfounded—in children and adolescents. Note also that the links between risk judgments and actions are tenuous at best (Kegeles, Adler, & Irwin, 1989; Tinsley, 1992; Whalen & Kliewer, 1994). In analyzing these complex relationships, it might help to distinguish between two concurrent developmental processes. One concerns human development in the broadest sense—the biological, cognitive, and psychosocial changes that attend middle childhood and adolescence (e.g., increases in physical prowess, autonomy, problem-solving competencies, and peer group salience). The other concerns the ever-changing nature of risk perception–risk behavior

linkages. In their penetrating explication of these latter issues, Weinstein and Nicolich (1993) reminded us that both the cognitive and the behavioral facets evolve over time, each domain modifying and being modified by the other in a dynamic interplay. In a sense, there is a developmental chain of identification, action, and analysis that unfolds for each specific risk, starting with the earliest glimmer of awareness. When focusing on health promotion in young people, a dual developmental perspective would seem most promising, one that considers these bidirectional changes in belief–behavior linkages within a context of individual growth.

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