

Risk-Perception: Differences Between Adolescents and Adults

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This study investigated age changes in risk perception and unrealistic optimism. Teenagers ($n = 376$) and parents ($n = 160$) evaluated the risk of experimental, occasional, and regular involvement in 14 health-related activities (e.g., getting drunk). Respondents also evaluated their comparative chances of encountering the leading causes of morbidity and mortality. Compared with adults, teenagers minimized the perceived risk of experimental and occasional involvement in health-threatening activities. Notably, teenagers were less optimistic about avoiding injury and illness than were their parents, and teenagers at greatest risk for such misfortunes were the least optimistic about avoiding them. These findings do not support traditional explanations of adolescent risk taking. The implications of these findings for understanding and preventing health-damaging behavior among adolescents are discussed.

Key words: risk perception, age differences, adolescent health, unrealistic optimism

Adolescent risk taking has emerged as a leading public health concern. By age 19 most teenagers have experimented with at least one health-threatening behavior, and this experimentation places them at risk for an array of problems including sexually transmitted diseases (STDs), motor vehicle injuries, and alcohol-related accidents (Irwin, Brindis, Brodt, Bennett, & Rodriguez, 1991).

Despite centuries of speculation, it is not known why adolescents engage in seemingly reckless activities. Most adolescents report only occasional involvement in health-threatening behaviors, which suggests that a large proportion of adolescent risk taking reflects experimentation rather than problem behaviors per se (Hayes, 1987; Irwin et al., 1991; Johnston, Bachman, & O'Malley, 1990). It is not known, however, if adolescent experimentation is prompted by feelings of invulnerability and a willingness to take risks or, instead, simply reflects the failure of teenagers to perceive their own actions as unsafe. The former hypothesis has dominated professional thinking for decades, but it is based more on edict than evidence.

In the present study we addressed this gap in knowledge and

examined two related issues. First, we examined whether teenagers are more likely than adults to exaggerate their own invulnerability to harm; second, we examined whether teenagers are more likely than adults to minimize the harm associated with periodic risk taking (e.g., occasionally getting drunk).

Adolescent risk behavior is often attributed to exaggerated feelings of invulnerability. This proposition assumes that feelings of invulnerability are greater among teenagers than adults. This view of adolescence is at least as old as Aristotle, who portrayed teenagers as "indignant at the mere idea of enduring an injury" (cited in Katchadourian, 1977). Elkind (1974) provided a theoretical basis for this view, arguing that feelings of invulnerability are a byproduct of adolescent egocentrism; and the latter phenomenon, he argued, is an inevitable consequence of cognitive development. Many research reports and child development texts accept this general view of adolescence and attribute adolescent risk taking to inevitable feelings of invincibility.

There is notably little evidence to support the proposition that adolescents feel more invulnerable to harm than do adults. Indeed, recent studies have revealed a strong optimistic bias among adults, which indicates that feelings of invulnerability are not a uniquely adolescent phenomenon (Bauman & Siegel, 1987; Burger & Burns, 1988; Weinstein, 1980). Only one published study has directly compared the risk perceptions of adolescents and adults and, here too, the results do not support common wisdom. Eighty-six low-risk teens and their parents estimated their own likelihood of encountering four health threats (alcohol dependency, mugging, auto accident, and unplanned pregnancy). Teenagers did not perceive themselves to be less likely than their parents to encounter misfortune (Quadrel, Fischhoff, & Davis, 1993).

The present study expands on previous work in several important ways. First, we increased the domain of health threats evaluated by teenagers, focusing specifically on adolescent feelings of invulnerability toward the leading causes of adolescent morbidity and mortality. Second, we examined

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This research was supported by Grant MH47167-02 from the National Institute of Mental Health. We gratefully acknowledge the logistical support provided by Manuel Schydlower, John Foley, Suzanne Cuda, and Keith Ramsey of the William Beaumont Army Medical Center. We also gratefully acknowledge helpful comments by Mara Weiss Cohn on previous drafts of this article.

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whether feelings of invulnerability are greatest among teenagers who report engaging in health-threatening behavior, an outcome predicted by the invulnerability hypothesis. Finally, we looked at whether teenagers regard their own behavior as safe by examining whether teenagers perceive occasional involvement in health-threatening activities as less harmful than do their parents.

Method

Participants

Adolescent sample. Participants were 376 teenagers (mean age = 15.2 years) recruited from a large adolescent medicine clinic. Approximately equal numbers of boys and girls were recruited from five age groups: 13, 14, 15, 16, and 17–18 years. The sample was ethnically diverse: 50% Anglo, 28% Hispanic, 14% Black, and 8% classified as Other. Teenagers were paid \$5.00 for their participation.

Adolescents were recruited from a population of approximately 1,154 patients attending the clinic during the 14 weeks of data collection. Interviewers were instructed to recruit every eligible patient arriving at the clinic. Six hundred thirty-six adolescents were invited to participate in the study; 70% gave their consent and 59% completed the survey forms. Only 16% of the patients declined participation. The latter patients were not significantly different in age or gender from patients who participated in the study.

Parent sample. Participants were 160 parents of adolescents from the clinic. The mean age of the sample was 41.0 years (range = 28–62). Seventy-nine percent of the parents were female. The sample was ethnically diverse: 54% Anglo, 33% Hispanic, 11% Black, and 2% classified as Other. Parents were paid \$5.00 for their participation.

Recruitment of a parent was initiated after the parent's child had agreed to participate in the study. Two hundred parents were initially invited to participate in the study. Each parent had one child participating in the study. The latter teenagers were slightly younger than the teenagers who had no parents in the study ($M_s = 14.9$ and 15.3 years, respectively).

Measures

Unrealistic optimism. Perceived invulnerability to harm was assessed with Weinstein's (1980, 1982, 1987) comparative risk rating procedure for assessing unrealistic optimism. Respondents were presented with a booklet containing a list of health outcomes and life events that they might experience in the future (see Table 1). Respondents indicated if they were more likely or less likely than same-sex peers to encounter the outcome (e.g., "Compared to other boys your age, how likely are you to be hurt in a car accident?"). Comparative assessments were made with 5-point scales that ranged from -2 (*much less likely*) to 2 (*much more likely*). Mean values less than zero indicate the presence of an optimistic bias in the sample. The larger the departure from zero, the greater the optimism.

Nineteen health problems and undesirable life events were listed in the rating booklet; nine additional items depicting positive health and life outcomes were also included in the rating form.

Perceived harm. Respondents evaluated the potential harm associated with 14 health-threatening behaviors (see Table 2). Assessments were made with 5-point scales that ranged from 1 (*no harm*) to 5 (*very great harm*).

Respondents produced three sets of ratings for each activity. First, respondents evaluated the harm associated with experimental involvement in each activity (e.g., "In your opinion how much will you harm yourself [physically or mentally] if you try smoking cigarettes once or twice, just to see what it is like?"). Next, respondents rated how harmful the activity would be to themselves if they engaged in the

Table 1
Mean Optimism Scores for Parents and Children

Event	Parents (<i>n</i> = 160)	Children ^a (<i>n</i> = 160)	All teens ^b (<i>n</i> = 376)
Negative events			
1. Get hooked on drugs like marijuana	-1.83	-1.63**	-1.65**
2. Be pressured to try something you don't really want to try	-1.59	-0.83**	-0.86**
3. Get AIDS	-1.58	-1.29**	-1.31**
4. Ride home from a party with a driver who has had too much to drink	-1.55	-1.25**	-1.19**
5. Think about dying of suicide	-1.45	-0.97**	-0.93**
6. Get hooked on cigarettes	-1.14	-1.39	-1.31**
7. Get sick or catch a cold	-0.76	0.17**	0.11*
8. Be a victim of a mugging (attacked by a member of a gang) ^c	-0.65	-0.50	-0.53**
9. Be hurt in a car accident	-0.56	-0.39**	-0.35**
10. Develop gum disease or other problems with your mouth	-0.47	-0.65	-0.79**
11. Be more than 35 (25) pounds overweight by age 60 (30) ^c	-0.42	-0.80**	-0.72**
12. Develop cavities or other types of tooth decay	-0.37	-0.43	-0.47**
13. Develop cancer in later life	-0.13	-0.29	-0.32**
14. Get a sexually transmitted disease	—	—	-1.24**
15. Have sex without using birth control	—	—	-1.00**
16. Get a kidney infection	—	—	-0.57**
17. Develop diabetes	—	—	-0.47**
18. Get carried away and have sex without talking about it in advance	—	—	-0.38**
19. Develop high blood pressure	—	—	0.01
Positive events			
1. Own stereo or TV by age 30	—	—	1.09**
2. Own a car by age 30	—	—	0.95**
3. Graduate from college	—	—	0.89**
4. Develop good driving skills	—	—	0.74**
5. Get a job that you want	—	—	0.70**
6. Make a lot of money	—	—	0.66**
7. Know when you have had too much to drink at a party	—	—	0.64**
8. Stay in good physical shape	—	—	0.52**
9. Start dating someone great	—	—	0.36**

Note. Because of missing data, *ns* vary. Dashes indicate items that were not administered to adults.

^aSignificance levels in this column refer to pairwise comparisons between adolescents and their parents.

^bSignificance level in this column refers to one-sample *t*, which tested whether the mean was significantly different from zero.

^cMaterial in parentheses indicates the wording on adolescent forms.

p* < .05. *p* < .01.

behavior occasionally (e.g., "In your opinion how harmful would it be to you [physically or mentally] if you sometimes smoke cigarettes?"). Finally, participants evaluated the harm associated with frequent involvement in each activity (e.g., "In your opinion how harmful would it be to you [physically or mentally] if you often smoke cigarettes?").

Table 2
Mean Ratings of Perceived Harm by Level of Involvement

Activity	Experimental involvement		Occasional involvement		Frequent involvement	
	Teen	Parents for teen ^a	Teen	Parents for teen	Teen	Parents for teen
Skateboard	2.0	2.2	2.1	2.4*	2.6	2.7
Pig out	2.1	2.8***	2.6	3.2***	3.5	4.2***
Drink alcohol	2.6	3.5***	3.3	4.1***	4.4	4.8***
Use diet pills	2.8	3.8***	3.3	4.1***	4.1	4.7***
Use cigarettes	3.0	3.6***	3.6	4.1***	4.4	4.8***
No seat belts	3.0	4.3***	3.3	4.5***	4.0	4.8***
Get drunk	3.2	4.2***	3.7	4.5***	4.4	4.8***
Sniff glue	3.6	4.6***	4.1	4.8***	4.6	4.9***
Drive home after drinking a few beers	3.8	4.5***	4.2	4.7***	4.6	4.8***
Drag race	3.8	4.6***	4.1	4.7***	4.5	4.8***
Use steroids	3.8	4.4***	4.2	4.6***	4.7	4.9*
Use marijuana	4.1	4.2	4.4	4.5	4.8	4.8
Use cocaine	4.5	4.8***	4.7	4.9*	4.9	4.9
Drive drunk	4.5	4.7*	4.6	4.8*	4.8	4.9

Note. Rating scale: 1 = no harm, 5 = very great harm.

^aParents' evaluations of how harmful the activity would be for their teenager.

* $p \leq .05$. *** $p \leq .005$.

In addition to the above ratings, parents completed a second task that evaluated how harmful each activity would be for their child (e.g., "In your opinion how much will your teenager harm himself/herself [physically or mentally] if he/she tries smoking cigarettes once or twice, just to see what it is like?"). Assessments were made on a 5-point scale (1 = no harm, 5 = very great harm).

Health behaviors. We used single-item self-report scales to assess the frequency of health-related behaviors (e.g., cigarette smoking, alcohol use). Many response categories were adapted from those of Chassin et al. (1981). For example, smoking status was assessed with the following scale: (1) "I have never smoked a cigarette, not even a few puffs" (*nonsmoker*); (2) "I have smoked a cigarette or a few cigarettes just to try it, but I have not smoked in the past month" (*experimental smoker*); (3) "I no longer smoke, but I used to" (*exsmoker*); (4) "I smoke, but not more than one cigarette a month"; (5) "I smoke regularly, but not more than one cigarette a week"; (6) "I smoke more than one cigarette a week." Only 18 subjects selected Categories 4 and 5; hence Categories 4, 5, and 6 were combined to form a single classification: *current smoker*.

Procedure

Questionnaires were administered to adolescents after their medical appointments. Questionnaires were administered as part of a larger study and battery of tasks designed to assess risk perception among adolescents (e.g., Cohn, Schydlower, Foley, & Copeland, 1995). Surveys were administered individually and in private offices by nonclinic staff. Assessments of unrealistic optimism and perceived harm were completed prior to completion of the survey of health behaviors. Surveys were completed anonymously. Parents completed the surveys in the clinic waiting area.

Results

Behavioral Characteristics of the Sample

Fifty-seven percent of the adolescent sample reported smoking cigarettes at least once, 43% reported getting drunk at least once, and 16% reported using inhalants at least once. These lifetime prevalence rates are not significantly different from

lifetime prevalence rates reported in a national survey of adolescents (Oetting & Beauvis, 1990). The lifetime prevalence rate of sexual activity (53%) in our sample of older teenagers ages 15–18 is not significantly different from the rate reported in a national survey of 9th–12th-grade students (Centers for Disease Control, 1991). Lifetime prevalence rates for alcohol use were lower in our sample than in national data.

Unrealistic Optimism

Adolescent optimism. Adolescents evaluated their comparative likelihood of encountering 19 health problems and negative life events. The mean rating for this set of outcomes was significantly less than zero ($M = -0.75$), one-sample $t(221) = 23.0$, $p < .001$, which supports the common belief that adolescent judgments are characterized by an optimistic bias. Table 1 presents the mean comparative judgment ratings for all 19 items. One-sample t tests revealed significant optimism for 17 of the 19 comparisons (all $ps < .05$). This many results in the predicted direction are unlikely to occur by chance ($p < .001$, binomial test).

The likelihood of encountering positive events was also evaluated by adolescents. As predicted, the mean rating for the set of outcomes was significantly greater than zero ($M = 0.73$), one-sample $t(360) = 28.6$, $p < .001$.

A 2×5 analysis of variance (ANOVA) revealed no significant main effects for age, sex, or their interaction (all $ps > .10$).

Adolescent-parent differences in optimism. Table 1 presents the mean comparative judgment ratings for the 13 negative events that were evaluated by adolescents and their parents. On average, adolescents were less optimistic about their comparative chances of avoiding injury and illness than were their parents ($M_s = -0.79$ and -0.97 , respectively), $t(142) = 3.38$, $p < .01$.

It is conceivable that teenagers in our sample had atypically low unrealistic optimism scores because of their medical

conditions; if so, then the latter bias would distort teen-parent comparisons. To examine this possibility, we reviewed the clinic records of more than 160 participants in our sample. Seventy-one sought medical care for cold and flu symptoms (e.g., fever, vomiting, or sore throat); 46 sought care for injuries, dizziness, and related acute symptoms; and 41 arrived at the clinic for school physicals and other non-illness-related reasons (e.g., accompanying a friend). Comparative risk ratings did not differ significantly among these groups of ill and healthy teenagers ($F < 1.0, p > .20$), which suggests that optimism was not suppressed among our sample of ill teenagers.

Perceived Harmfulness

Sex and age differences during adolescence. We used two-way ANOVA to assess age and sex differences in perceived harm. Small but significant sex differences were present in male and female ratings of the perceived harm of experimental involvement ($M_s = 3.2$ and 3.4 , respectively), occasional involvement ($M_s = 3.7$ and 3.8 , respectively), and regular involvement ($M_s = 4.2$ and 4.4 , respectively) in the set of 14 behaviors listed in Table 2 ($p_s \leq .06$). Neither age nor interaction effects were present.

Adolescent-parent differences. We conducted a between-subjects multivariate analysis of variance to assess teen-parent differences in the perceived harm of each of the 14 activities. Age group (adolescent vs. adult) served as the between-subjects variable; evaluations of the 14 behaviors listed in Table 2 served as the dependent variables. As expected, teenagers rated the activities as significantly less harmful than did their parents: experimental involvement, Hotelling's T^2 , $F(14, 297) = 14.9, p < .001$; occasional involvement, Hotelling's T^2 , $F(14, 291) = 16.5, p < .001$; frequent involvement, Hotelling's T^2 , $F(14, 290) = 12.7, p < .001$. In general, teen-parent differences were greatest when respondents evaluated the harmfulness of trying activities once or twice; in contrast, teen-parent differences were smallest when respondents evaluated the harm associated with frequent involvement in the set of activities. Figure 1 summarizes these findings.

Follow-up univariate analyses revealed many teen-parent differences in perceived harm. For example, experimental involvement in 10 of the 14 behaviors was perceived as significantly less harmful by teenagers than by parents (all $p_s \leq .06$). Large teen-parent differences were obtained in the ratings of two behaviors: sniffing glue once or twice ($M_s = 3.6$ vs. 4.5 , respectively) and not using seat belts once or twice ($M_s = 3.0$ vs. 4.1 , respectively). Additional differences between adolescents and adults were obtained when respondents evaluated the harm of getting drunk once or twice ($M_s = 3.2$ vs. 3.7 , respectively), using diet pills once or twice ($M_s = 2.8$ vs. 3.3 , respectively), and using steroids once or twice ($M_s = 3.8$ vs. 4.3 , respectively).

For each level of involvement (experimental, occasional, and regular) parents evaluated how harmful each activity would be for their adolescent. We compared the latter ratings to the ratings produced by the adolescents themselves (see Table 2). Notably, parents rated the activities as significantly

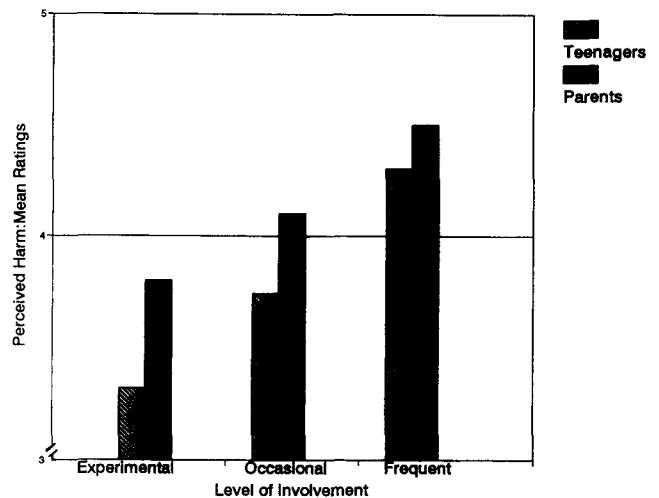


Figure 1. Teen-parent differences in the perceived harm of 14 activities (rating scale: 5 = very great harm, 1 = no harm).

more harmful for their teenagers than did the teenagers themselves: experimental involvement, Hotelling's T^2 , $F(14, 275) = 12.3, p < .001$; occasional involvement, Hotelling's T^2 , $F(14, 272) = 13.0, p < .001$; frequent involvement, Hotelling's T^2 , $F(14, 284) = 7.8, p < .001$.

Large differences in risk perception emerged when teenagers and parents evaluated the harm associated with teenagers' experimental use of alcohol. For example, 31% of the teenagers believed that getting drunk at a party once or twice entailed slight or no harm to themselves; in contrast, only 9% of the parents rated the activity as safe for their teenager. Likewise, 54% of the adolescents indicated that drinking alcohol once or twice entailed slight or no harm to themselves; in contrast, only 31% of the parents reported that drinking alcohol entailed slight or no harm to their teenager.

Finally, we examined whether parents regard involvement in health-threatening activities as more dangerous for their children than for themselves. Parents rated nine of the health-threatening activities as significantly more harmful for their children than for themselves ($p < .05$ for all paired t tests), including drinking alcohol, getting drunk, using diet pills, driving after drinking, drag racing, smoking pot, smoking cigarettes, and not wearing seat belts.

Experience and Risk Perception

In general, unrealistic optimism scores decreased as involvement in health-threatening activities increased. This relationship was significant or marginally significant for 12 of the 14 comparisons. For example, current smokers were significantly less optimistic about avoiding cancer than were nonsmokers and experimental smokers (mean unrealistic optimism scores = -0.27 , -0.51 , and -0.44 , respectively; Student-Newman-Keuls test, $p < .05$). Current smokers were also less optimistic about avoiding cigarette addiction than were nonsmokers and experimental smokers (mean unrealistic optimism scores = 0.77 , -1.85 , and -1.68 , respectively; Student-Newman-Keuls test, $p < .05$). Similarly, sexually active

teenagers were less optimistic than virgins about avoiding STDs, less optimistic about avoiding spontaneous sex, and less optimistic about avoiding sex without birth control (all Student-Newman-Keuls tests were significant; see Figure 2).

Discussion

Adolescent involvement in health-threatening activities is frequently attributed to unique feelings of invulnerability and a willingness to take risks. The present findings do not support either proposition and instead suggest that many adolescents do not regard their behavior as extremely risky or unsafe. Compared with their parents, teenagers minimized the harm associated with periodic involvement in health-threatening activities. Ironically, it is periodic involvement in these activities that jeopardizes the health of most adolescents. Thus teenagers may be underestimating the risk associated with the very activities that they are most likely to pursue, such as occasional intoxication, drug use, and reckless driving. This proposition is consistent with other recent findings. Young drivers, for example, perceive less risk in tailgating, speeding, and night driving than do older drivers, which suggests that accident rates among youth may reflect a failure to perceive dangerous situations rather than a desire to pursue risks (Finn & Bragg, 1986; Jonah, 1986; Matthews & Moran, 1986). The present findings suggest that adolescents' involvement in many health-threatening activities could be reduced by increasing the perceived risk of participating in them. The decline in marijuana use among high school seniors between 1979 and 1986, for example, has been attributed to an increase in its perceived harmfulness (Bachman, Johnston, O'Malley, & Humphrey, 1988).

The current findings differ from the findings reported by Beyth-Marom, Austin, Fischhoff, Palmgren, and Jacobs-Quadrel (1993), who observed no teen-parent differences in

risk perception. Methodological differences most likely account for the differences between their results and ours. Beyth-Marom et al. had participants generate lists of outcomes associated with risky behaviors, whereas we had participants evaluate the harmfulness of the outcomes. The contradictory results emerging from the two studies highlight the importance of using a variety of measurement procedures when one examines risk perceptions.

The current findings do not support the proposition that adolescents feel more invulnerable to harm than do adults. Teenagers in our study were less optimistic about their comparative chances of avoiding illness and misfortune than were their parents. Moreover, the biggest risk takers in the sample were the least likely to exaggerate their own invulnerability to harm, an outcome not predicted by the invulnerability hypothesis. It is possible that our findings reflect sampling peculiarities arising from participant recruitment in a clinic setting. Two findings mitigate against this interpretation. Kulik and Mahler (1987) found no differences between ill and healthy college students (recruited from clinic and nonclinic settings, respectively) in their comparative likelihood ratings of nonhealth problems (e.g., auto accident, suicide, or mugging). Notably, nonhealth problems accounted for the majority of negative outcomes presented to adolescents and adults in the present study. Moreover, healthy and ill teenagers in our study did not differ significantly in unrealistic optimism scores. Additional studies will be needed if we are to identify the roles of recruitment site, mood, and related factors in the assessment of unrealistic optimism.

Adolescents who were involved in health-threatening behaviors (e.g., smoking) acknowledged, to some degree, their own increased vulnerability to harm. Moreover, teenagers recognized that their increasing involvement in health-threatening activities posed an increasing health threat to themselves. Why, then, do teenagers appear so reckless to adults? Our findings suggest two related explanations. First, experimental involvement in many health-threatening activities is regarded as less harmful by teenagers than by adults. Hence actions that appear prudent to teenagers may appear reckless to their parents (e.g., getting drunk once or twice to see what it is like). Moreover, parents seem to regard many activities as more dangerous for their teenagers than for themselves (e.g., driving without seat belts). The latter bias may magnify the apparent recklessness of adolescent behavior.

Although teenagers displayed less unrealistic optimism than their parents, it is important to note that teenagers were unequivocally optimistic about avoiding harm and misfortune, a finding that is consistent with the belief that teenagers feel invulnerable. Indeed, teenagers were most optimistic about their comparative chances of avoiding the leading threats to adolescent health. For example, 90% of accidents involving youth are thought to be alcohol related; yet adolescents in our study believed that they were more likely than their peers to avoid riding with drunk drivers and more likely to recognize when they, themselves, drink too much alcohol at a party. It is not known how such optimism contributes to adolescent risk taking.

The current findings suggest several avenues for future research. First, it is important to identify additional factors

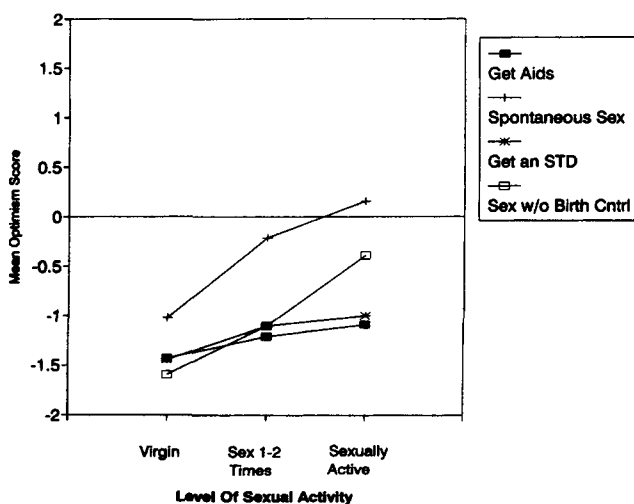


Figure 2. Sexual status and perceived susceptibility to AIDS, sexually transmitted diseases (STDs), spontaneous sex, and sex without (w/o) birth control (Cntrl; values less than zero indicate that teens viewed themselves as less likely than same-sex peers to encounter the event).

that influence perceived risk during adolescence. For example, occasional risk taking does not typically result in injury, and this may lead teenagers to mistakenly interpret the risk of harm as cumulative across situations when it may actually be independent across situations. Notably, individuals take more risks when health hazards are viewed as cumulative rather than noncumulative (Diamond, 1990), which suggests that future studies should examine how teenagers intuitively define the risk distributions of activities such as speeding or unprotected sex, where a single exposure may lead to injury or illness. The contribution of unrealistic optimism to perceived risk also requires additional study. It is not known why teenagers believe that they are more likely than their peers to avoid specific health-related problems, such as auto accidents or suicide ideation. Identifying the reasons underlying unrealistic optimism should improve current strategies for reducing health-threatening behavior.

Experimentation is regarded by many investigators as a healthy component of adolescent development (e.g., Baumrind, 1987); it may also serve as one of the most effective deterrents to adolescents' long-term involvement in many health-threatening activities (e.g., smoking; Hirschman, Leventhal, & Glynn, 1984). There exists a subset of behaviors, however, for which experimentation may jeopardize the safety of adolescents (e.g., driving after drinking). Increasing the perceived risk of the latter activities should reduce some of the major threats to adolescent health without eliminating other opportunities for successful experimentation.

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