

## **A Measure of Risk Taking for Young Adolescents: Reliability and Validity Assessments**

**Cheryl S. Alexander,<sup>1</sup> Young J. Kim,<sup>2</sup>  
Margaret Ensminger,<sup>3</sup> Karin E. Johnson,<sup>4</sup>  
B. Jill Smith,<sup>5</sup> and Lawrence J. Dolan<sup>6</sup>**

*Received January 10, 1990; accepted July 21, 1990*

*Researchers often define adolescent risk taking in terms of individual behaviors such as alcohol and drug use, early sexual activity, and reckless driving. It is not clear whether these behaviors defined by adults as "risky" have the same meaning for adolescents. This paper describes the development and preliminary testing of an instrument to assess risk taking among young adolescents. The six item scale was constructed by asking small groups of eighth grade boys and girls to describe "things that teenagers your age do for excitement or thrills." The measure was then used in a longitudinal study of 758 young adolescents from three rural counties in Maryland. The scale shows good reliability, as indicated by coefficient alpha and factor analyses. Eighth-grade scores on the scale are associated with the initiation of sexual activity and substance use in ninth grade among virgins and nonusers of alcohol, marijuana, cocaine and pills in eighth grade.*

<sup>1</sup>Associate Professor, Department of Maternal and Child Health, Johns Hopkins School of Hygiene and Public Health.

<sup>2</sup>Professor, Department of Population Dynamics, Johns Hopkins School of Hygiene and Public Health.

<sup>3</sup>Assistant Professor, Department of Health Policy and Management, Johns Hopkins School of Hygiene and Public Health.

<sup>4</sup>Professor, School of Nursing and Health Sciences, Salisbury State University.

<sup>5</sup>Research Associate, Department of Maternal and Child Health, Johns Hopkins School of Hygiene and Public Health.

<sup>6</sup>Assistant Professor, Department of Mental Hygiene, Johns Hopkins School of Hygiene and Public Health.

## INTRODUCTION

Adolescence is generally considered as a time of risk taking. The major causes of death and disability for youth 15–19 years of age, motor vehicle injuries, other accidental injuries, suicide, and homicide, are rooted in behaviors that carry social and health risks (National Center for Health Statistics, 1984). Other behaviors such as sexual intercourse without protection against pregnancy or sexually transmitted diseases or driving when intoxicated have been offered as evidence of a risk taking propensity among teens (White and Johnson, 1988; Byrne and Fisher, 1983). For the most part, researchers have used individual behaviors to define adolescent risk taking. It is not clear whether behaviors defined by adults as “risky” carry the same connotation for young people. For example, driving fast may be viewed as risky by adults but the sign of a good driver by young adolescents. Risk taking may best be defined within the adolescent’s own social context.

In this paper, we review two major theoretical approaches to the conceptualization and measurement of risk taking behavior during adolescence. We describe the development and preliminary testing of an instrument to assess risk taking among young adolescents.

## THEORETICAL APPROACHES TO RISK TAKING

Jessor’s (1977) theory of problem behavior suggests that drinking, marijuana use, delinquency, and early sexual intercourse constitute a syndrome of behaviors that deviate from societal norms for adolescents. The onset of these behaviors is preceded by a psychosocial pattern of unconventional attitudes and perceptions. Studies of high school- and college-age populations indicate that adolescents who place a lower value on academic achievement and have lower self-esteem, greater tolerance of deviance, less religiosity, and a greater attachment to the positive aspects of problem behaviors are more likely to initiate those behaviors than those who do not share their perceptions (Jessor, 1983). Engagement in any one problem behavior increases one’s susceptibility to engage in others.

Jessor’s construct stresses the cognitive aspects of risk taking. Adolescents who are prone to engage in risky behaviors are characterized by a set of shared attitudes, perceptions, and values about themselves and society. A second perspective focuses on the emotional components of risk taking, that is, taking risks for pleasure and excitement. Zuckerman and his colleagues (1984), in their studies of stimulus-seeking behavior, developed an instrument to assess individual differences in optimal stimulation. The Sensation Seeking Scale differentiates individuals with strong

needs for stimulation and arousal from those with fewer stimulus needs. In general, individuals with high sensation-seeking scores are uninhibited, nonconforming, and impulsive and have high needs for independence and change (Zuckerman and Link, 1968). In a series of studies using college students and young adults, individuals scoring high on sensation seeking reported a more varied patterns of drug use and sexual activity than low-scoring individuals (Zuckerman *et al.*, 1972).

The Sensation Seeking Scale was developed and tested using college students. Items reflect the experiences and activities of young adults. Our development of a risk-taking scale for young adolescents is based on both models and incorporates items on thrill seeking and involvement in deviant acts within the context of a population of 13–14 year olds.

## METHODS

### Design

A longitudinal cohort design was used to examine the antecedents of health-compromising behaviors among rural adolescents. Health-compromising behaviors are defined as those behaviors initiated during the adolescent years that have long-term health and social consequences. These behaviors include tobacco, alcohol, and other drug use and early unprotected sexual intercourse. A cohort of rural students was surveyed annually over a 3-year period from eighth to tenth grade. Participants had their heights and weights measured and completed an assessment of their own pubertal development in each of the study years. In ninth grade, parents of participating students were interviewed about their perceptions of their adolescent's health and behavior, about their educational expectations for their youngster, and about family characteristics and family functioning. Information on standardized test scores and grades from eighth to tenth grades were obtained from school records. Analyses presented in this paper are based on data from the first 2 years of the 3-year study.

### Sample

All eighth-grade students enrolled in seven public schools in 1986–1987 in three rural counties in Maryland were invited to participate. The decision to include all students was based on the size of the schools and school officials' concerns about selecting some students and not others. Local advisory boards were created in each county to review survey

materials and to monitor the administration of the study. Letters were sent to parents and students inviting participation. A few small but vocal groups in two of the counties objected to questions that asked students about their sexual experiences. Parent refusal rates in those two counties ranged from 20 to 35%.

The study sample of 758 eighth graders represented 64% of the total eligible population. The race and gender composition and California Cognitive Skills Test scores of participants did not differ significantly from distribution for the total cohort of eighth grade students. In ninth grade, 120 students were added to the study. These young people represented students who had transferred into the school systems or whose parents agreed to have them participate in high school. In this paper, we have used the total sample of students in the eighth and ninth grades as well as a subsample of panel students for whom we have *both* eighth- and ninth-grade information.

### Measure of Risk Taking

The measure of risk taking was constructed using small focus groups of 8 to 10 students. Each group contained only males or females. These focus groups were part of the pilot testing of the questionnaire. Thirty-five students from a school not included in the study agreed to talk with the investigators about their health concerns and the kinds of behaviors engaged in by students in their school. They also agreed to complete the questionnaire and provide feedback regarding the clarity and appropriateness of items for rural adolescents. Students were asked to describe "things that teenagers your age do for excitement or thrills." Although there was overlap in what males and females reported as risking behaviors, boys focused on more daring physical feats such as racing a dirt bike and walking across a bridge rail, while girls were more likely to indicate disobedience or rule breaking. Suggestions were recorded and then collapsed into six items representing those common themes that the students agreed signaled risk taking. Students were asked about frequency categories for the risk-taking items. A three-level ordinal response scale was selected (Never, Once or Twice, and Several Times). An overall risk-taking score was computed by summing over the six items. Possible scores ranged from 6 to 18.

## RESULTS

Table I shows the frequency distributions of items at each time period. Items involving physical feats such as racing on a bike or boat show

**Table I.** Percentage Distribution of Responses to Risk-Taking Items in Eighth and Ninth Grades<sup>a</sup>

Item	8th grade			9th grade		
	Never	Once or twice	Several times	Never	Once or twice	Several times
Race on a bike or boat (Raced)	52.4	21.5	26.1	58.9	21.5	19.6
Did something risky or dangerous on a dare (Dare)	40.3	33.6	26.1	40.2	40.9	18.9
Broke a rule that your parents set for you just for the thrill of seeing if you could get away with it (Broke Rule)	37.9	35.3	26.8	37.1	40.2	22.7
Stole or shoplifted (Steal)	76.8	15.1	8.1	77.7	15.7	6.6
Slipped out at night while your parents thought you were asleep (Sneaked Out)	70.8	18.3	10.9	68.5	22.0	9.4
Willingly ridden in a car with someone you knew was a dangerous driver (Dangerous Driver)	64.6	22.0	13.4	57.0	28.3	14.7

<sup>a</sup>Eighth grade, *n* = 758; ninth grade, *n* = 781.

**Table II.** Item-Total Correlations and Alpha Coefficient<sup>a</sup> of Risk-Taking Items

Item	Coefficient	
	8th grade	9th grade
Raced	.44	.35
Dare	.62	.59
Broke Rule	.56	.60
Steal	.46	.49
Sneaked Out	.54	.53
Dangerous Driver	.54	.61
Alpha	.78	.80
Sample size	732	761

<sup>a</sup>Standardized item alphas.

a decline in the percentage of students who report frequent involvement; on the other hand, more students at time 2 reported having ridden with a dangerous driver at least once. Such shifts would be expected as students move into high school and have greater exposure to older students.

**Table III.** Percentage Shifts in Responses to Risk-Taking Items from Eighth to Ninth Grade

Response	Item (%) <sup>a</sup>					
	Raced	Dare	Broke Rule	Steal	Sneaked Out	Dangerous Driver
Remained same <sup>b</sup>	60	57	53	73	67	60
Moved up	16	19	23	13	18	25
Moved down	24	24	24	14	15	15
Kappa (%) <sup>c</sup>	32	34	28	27	28	26

<sup>a</sup>Response categories are 1 = never, 2 = once or twice, and 3 = several times.

<sup>b</sup>For each item, remained same represents students who gave the same response in both eighth and ninth grade.

<sup>c</sup>Kappa statistic calculated  $\kappa = \frac{(\text{Observed agreement} - \text{expected agreement})}{(1 - \text{expected agreement})}$ .

**Table IV.** Factor Loadings<sup>a</sup> of Risk-Taking Items

Item	8th grade		9th grade	
	Factor	<i>h</i>	Factor	<i>h</i>
1. Raced	.596	.353	.524	.324
2. Dare	.767	.588	.742	.612
3. Broke Rule	.730	.533	.719	.499
4. Steal	.631	.398	.639	.397
5. Sneaked Out	.705	.497	.688	.434
6. Dangerous Driver	.702	.493	.737	.529
Eigenvalue	2.86		2.76	
Percentage of variance	47.80		46.10	

<sup>a</sup>Extracted factors using principal-components analysis.

## Reliability

The internal consistency of the Adolescent Risk Taking Scale (ARTS) was assessed at each time period. Table II shows the item-to-total correlations and the alpha coefficients for the scale in eighth and ninth grade. Coefficients of .78 and .80 for a six-item scale indicate good internal consistency. Item-to-total correlations remain relatively stable over the 1-year period.

## Shifts in Item Responses

Internal consistency assessments at each time period do not take into consideration shifts in individual item responses over the two time periods. To examine item response patterns, we first compared the distribution of responses to each of the six risk-taking items for students who remained

in the study over the 1-year period ( $n = 661$ ) with those who dropped out in ninth grade ( $n = 97$ ) and those students who joined the study in ninth grade ( $n = 120$ ). No significant differences in the response distributions between stayers and either dropouts or joiners were noted. We then examined the responses of the stayers or panel students. Overall, students were consistent in their reporting of individual items from eighth to ninth grade, with between 53 and 73% of the adolescents giving the same response each year (Table III). Rule breaking showed the greatest movement, while stealing exhibited the greatest stability. This may reflect the relative ambiguity of the items. Stealing is relatively unambiguous while rule breaking is more subjective and is open to different sets of rules at different times. Daring and racing on a bike or boat showed downward movement. In contrast, 25% of the students gave more frequent reports of riding with a dangerous driver in ninth grade. These shifts are indicative of the changing social context of young adolescents as they move from pedal to motor vehicles. Kappa statistic percentages range from 26 to 34, indicating moderate agreement. Note that stealing, the item showing the greatest stability over the 1-year period, had one of the lower Kappa values. This value is a direct result of the item having both high observed agreement and high expected agreement.

Factor analyses using principal-components analyses were performed at each time period. As seen in Table IV, findings indicate a unifactorial structure for risk-taking items in both eighth and ninth grades. Items show fairly strong loadings ranging from .524 to .767. The amount of variance in the matrix explained by the single factor is moderate but respectable. The analysis offers support for the unidimensionality of risk taking.

Since we suspected that there might be gender differences in risk taking, a second series of factor analyses was conducted separately for males and females in eighth and ninth grades. In eighth grade, a single factor emerged for both girls and boys, with similar factor loadings for both groups (data not shown). In ninth grade, two factors were extracted for girls and one factor for boys. For girls, racing on a dirt bike or boat loaded on the second factor (.7385), with the remaining five items loading on the first factor. This suggests that daring behavior is viewed differently from delinquent acts as girls mature.

### Validity

Thus far, we have assessed the reliability of the risk-taking scale and examined its structural properties. Some preliminary analyses have been conducted to address validity issues.

**Table V.** Factor Loadings of Risk-Taking and Anger Items

Item	8th grade			9th grade			
	Factor			Factor			
	I	II	<i>h</i>	I	II	III	<i>h</i>
Raced	.610	.080	.379	.035	.087	.770	.602
Dare	.736	.197	.581	.274	.220	.689	.599
Broke Rule	.684	.189	.504	.453	.188	.499	.490
Steal	.625	.096	.400	.735	.106	.019	.553
Sneaked out	.714	.053	.512	.651	.107	.330	.425
Dangerous Driver	.677	.183	.492	.592	.145	.395	.527
Stay Angry	.057	.580	.342	-.035	.630	.186	.433
Hit Someone	.203	.651	.466	.230	.689	.084	.535
Yell at People	.109	.745	.568	.185	.760	.061	.616
Lose Temper	.059	.829	.691	.077	.865	.089	.705
Get into Fights	.355	.619	.510	.286	.666	.139	.546
Eigenvalue	3.80	1.64		4.90	1.78	1.28	
Percentage of variance	34.60	14.90		32.70	11.90	8.60	

Risk-taking items were factor analyzed along with a five-item anger scale as an indicator of construct validity. Anger was chosen because we wanted to see if risk-taking behaviors could be differentiated from expressions of hostility. In eighth grade, risk items and anger items loaded on separate factors (Table V). Anger items continued to load on a single factor in ninth grade (Factor II in Table V); however, two distinct factors underlined the risk-taking data (Factor I and Factor III in Table V). Factor I is defined principally by items representing antisocial behaviors (i.e., stealing, sneaking out, and riding with a dangerous driver). Physical feats (i.e., racing on a bike or boat and taking a dare) load on Factor III, with rule breaking loading similarly on Factors I and III. Perceptions of risky behaviors in ninth grade become differentiated into thrill seeking and deviant behaviors in the presence of another construct, anger, with rule breaking as the ambiguous indicator.

Analyses were conducted to investigate the predictive validity of risk taking by examining the extent to which eighth-grade scores were associated with the initiation of behaviors that often serve as indicators of risk taking in the ninth grade. Five substances and two measures of sexual behaviors were identified. For substances such as cigarettes, alcohol, and pills where prior experimentation was reported by most eighth graders, 30-day use served as the indicator of health-compromising behaviors. For infrequently reported substances (i.e., marijuana and cocaine), a lifetime categorization was selected. Sexual intercourse was treated in two different ways. First, we ex-



**Table VI.** Associations Between Eighth-Grade Risk-Taking Scores and Ninth-Grade Behaviors

9th-grade behavior	8th-grade risk taking			$\chi^2$	Significance
	Upper 25%	Mid 50%	Lower 25%		
% ever had sexual intercourse <sup>a</sup> ( <i>n</i> = 297)	55.9	36.2	25.7	16.47	<i>p</i> < .000
% not using contraceptive ( <i>n</i> = 285)	8.7	6.3	6.1	0.43	ns
% ever used cocaine ( <i>n</i> = 619)	11.7	5.6	1.5	18.13	<i>p</i> < .000
% ever used marijuana ( <i>n</i> = 212)	32.0	22.1	5.4	38.74	<i>p</i> < .000
% smoked cigarettes in past 30 days ( <i>n</i> = 237)	32.8	28.4	26.2	0.86	ns
% drank alcohol in past 30 days ( <i>n</i> = 176)	72.2	47.4	40.4	6.28	<i>p</i> < .04
% used pills in past 30 days ( <i>n</i> = 596)	18.7	4.7	2.0	40.80	<i>p</i> < .000

<sup>a</sup>Sample size equals the number of students who reported no sexual intercourse or cocaine, marijuana, cigarette, alcohol, or pill used in the eighth grade.

amined the association between risk taking in the eighth grade and the transition to sexual intercourse in ninth grade among eighth-grade virgins. Second, we assessed the relationship between prior risk-taking status in eighth grade and sexual intercourse without the use of contraceptive methods in ninth grade. In this analysis, we considered sexual intercourse without protection as a health-compromising behavior rather than sexual intercourse per se. The decision to use quartiles to categorize risk-taking responses was based both on the distribution of responses and on the desire to examine ninth-grade behavioral transitions along a continuum of risk taking.

The subsample for these analyses was students who reported no involvement in the seven behaviors in eighth grade. Table VI shows associations between categories of risk taking in eighth grade and ninth-grade behaviors. As seen in the table, five of the seven behaviors demonstrate significant associations with eighth-grade risk-taking scores. Approximately 56% of the students who had eighth-grade risk-taking scores in the upper 25% of the distribution became sexually active in ninth grade, as compared with 26% of the students who were in the lower 25% of risk taking. A similar pattern is seen for the transition to alcohol, cocaine, marijuana, and pill use. Initiation of cigarette smoking and contraceptive use were not related to the risk-taking scale.

Analyses were conducted to determine if there were gender differences in the correlations between risk taking and health-compromising behaviors (data not shown). Patterns for boys and girls were similar and did not differ significantly from findings for the total sample.

## DISCUSSION

This paper describes a risk taking that is based on adolescents' reports of deviant and thrill-seeking behaviors. Young adolescents described both physically daring events and rule breaking as risky behaviors. The clustering of both types of items within a single factor clearly indicates that delinquent and physically daring behaviors are perceived similarly. Petty theft, sneaking out at night, and other forms of rule breaking may be addressing adolescent needs for excitement and arousal more than rebellion or the adoption of unconventional attitudes. Although more needs to be learned about the meaning ascribed to risky behaviors by adolescents, it is clear that young people can articulate a series of behaviors that they view as risky.

The six-item scale appears reliable and has some demonstrated predictive validity over a 1-year period. Those eighth-grade adolescents who score higher on the risk-taking scale were more likely to initiate sexual activity and substance use in ninth grade than those who scored lower. It also was distinct from a scale of hostile behavior.

As young people mature, the risk-taking construct may become more complex, reflecting the changing social context of adolescent experiences and a wider variety of behaviors. Some behaviors, like daring, may lose their risky quality as development proceeds and other behaviors take their place. Lewis and Lewis (1984) found that among a sample of fifth–eighth graders, daring behaviors occurred more frequently among eighth graders. In this study, the frequency of daring behaviors decline from eighth to ninth grade. It may be, however, that individuals who engaged in daring feats in eighth grade are the same adolescents who take chances in sports or who drive recklessly in high school. In our own longitudinal study, we will be examining the internal consistency of scores over 3 years and the predictive power of eighth-grade risk taking for tenth-grade behaviors, including reports of injuries, school dropout, and HIV-risking behaviors.

In this study, the transition from virginity to nonvirginity was associated with reported thrill-seeking and deviant behaviors in eighth grade, while contraceptive practice was not. For young adolescents, the use of contraceptives requires the execution of a variety of behaviors (i.e., accessing contraceptives, negotiating with a partner) that depend on sophisticated

communication, problem solving, and planning skills. Risk taking per se may play less of a role.

The Adolescent Risk Taking Scale was developed using adolescents who live in rural communities. Some items, such as racing on a bike or boat, may not be appropriate for young people in urban areas. Other items like stealing have more general applicability. This scale should be piloted before use with urban or suburban populations.

Risk taking is an important concept in studies of adolescent behavior. Its measurement is often confined to behaviors that are defined by adults as risky such as use of alcohol or drugs and early sexual intercourse. For researchers and policy makers interested in the antecedents of problem or health-compromising behaviors, a measure of risk-taking orientation is potentially useful in identifying young people who are likely to initiate drug and alcohol use or engage in sexual intercourse in their early teenage years.

## REFERENCES

- Byrne, D., and Fisher, W. (eds.) *Adolescents, Sex and Contraception*, Erlbaum, Hillsdale, NJ.
- Jessor, R. (1983). Adolescent development and behavioral health. In Matarazzo, J. (ed.), *Behavioral Health: A Handbook of Health Enhancement and Disease Prevention*, Wiley, New York.
- Jessor, R., and Jessor, S. (1977). *Problem Behavior and Psychosocial Development: A Longitudinal Study of Youth*, Academic Press, New York.
- Lewis, C., and Lewis, M. (1984). Peer pressure and risk-taking behaviors in children. *Am. J. Pub. Health* 74: 580-584.
- National Center for Health Statistics (1984). Public Health Service, U.S. Department of Health and Human Services Publication No. (PHS) 85-1232, Government Printing Office, Washington, DC.
- Zuckerman, M. (1984). Sensation seeking: A comparative approach to a human trait. *Behav. Brain Sci.* 7: 413-471.
- Zuckerman, M., and Link, K. (1968). Construct validity for the sensation seeking scale. *J. Consult. Clin. Psychol.* 32: 420-426.
- Zuckerman, M., Bone, R., Neary, R., Mangelsdoff, D., and Brustman, B. (1972). What is the sensation seeker? Personality trait and experience correlates of the sensations seeking scales. *J. Consult. Clin. Psychol.* 32: 420-426.