

Invulnerability and Risk Behavior in Early Adolescence

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Abstract

It is widely believed that adolescents engage in risk behaviors because of a heightened sense of invulnerability that compromises their judgment. Although the assessment of invulnerability has typically followed the lead of the *biases-and-heuristics* paradigm, the present approach assesses invulnerability as an individual differences construct by means of an Adolescent Invulnerability Scale (AIS). Five studies are reviewed that show that invulnerability presents two faces: it is a risk factor with respect to externalizing, health-compromising behavior; it is also associated with positive aspects of adolescent mental health. Future directions for research are noted.

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Introduction

It is widely assumed that adolescents engage in more risk behavior and enact riskier decisions because of their felt invulnerability to injury, harm and danger. Two research traditions have taken up the matter of invulnerability and its link to risk assessment. One tradition suggests that invulnerability is a result of pervasive *optimism bias* that is endemic to risk appraisal. A second tradition suggests that invulnerability has a developmental source, or else can be understood in light of developmental challenges common to adolescence, although different developmental models have been suggested in the literature.

Optimism Bias

The optimism bias approach has dominated the literature on invulnerability. This approach follows the *biases-and-heuristics* paradigm in its assumption that risk judgment is best modeled by asking individuals to estimate the chances, likelihood or probability that negative or untoward events would happen to the self (and to others). Decision-making is a matter of *intuitive statisticians* calculating subjective probabilities. Of course, intuitive statisticians are not very good at it, and, indeed the calculation of subjective probabilities tends toward a bias. Optimism bias is evident when individuals assume more favorable outcomes for the self than for others. Alternatively, individuals report that negative events are more likely to happen to others than to the self. We tend to be optimistic about our chances of getting cancer if we smoke, of contracting an STD if we are sexually active, of surviving a natural disaster if one comes our way. As Weinstein (1980, p. 806) put it, "people tend to think they are invulnerable." Consequently, if individuals start smoking, take up drugs, drive recklessly or engage in unprotected sex, it is because their decision-making is compromised by optimism bias that, in turn, induces a sense of invulnerability to the harmful consequences of these health compromising behaviors. Moreover, the implication for intervention is straightforward: induce a greater sense of vulnerability to the harmful consequences of this behavior.

The concept of optimism bias was first invoked to explain risk assessment in the field of health psychology. As a result it made few developmental assumptions. When researchers did address a developmental question it was to show that optimism bias is a general cognitive error and that adolescents were not uniquely disposed to optimism bias (or invulnerability) as one might have expected on the basis of, say, Elkind's (1967) theory of adolescent egocentrism. Elkind's theory suggested famously that adolescents tend to construct *personal fables* once cognitive development enters a transitional phase of formal operations. The fable of invulnerability, for example, was one example of the differentiation error of formal operations, and it was said to distort adolescents' judgment in critical situations and to increase the press towards reckless and risk-taking behavior (Arnett, 1992; Elkind, 1985).

By this account the reckless behavior of adolescents had a developmental source. It was a concomitant of emergent formal operations. Hence, on this basis, one might expect to find that invulnerability would show developmental variation. Yet research in the risk judgment literature showed that teenagers and adults do not appear to differ greatly in how they appraise risk, with both groups tending "to rely on similar, moderately biased psychological processes" that lead them to attribute more risky possibilities to target others rather than the self (Jacobs-Quadrel et al., 1993, p. 112; Furby & Beyth-Marom, 1992; Lapsley, 2003). These data would not support, then, a strong claim for the uniquely invulnerable adolescent and, indeed, would suggest that optimism bias is a pervasive characteristic of human decision-making.

Yet this conclusion must be tempered by studies that appear to show that optimistic bias is indeed stronger in adolescents than in adults (Cohn et al., 1995; Arnett, 2000); and by studies that show just the opposite (Millstein & Halpern-Felsher, 2002). In a comprehensive review of the literature Millstein and Halpern-Felsher (2001) concluded that popular conceptions of the invulnerable adolescent are mythical. Indeed, if anything, young adolescents feel unreasonably vulnerable to a wide variety of hazards; and it is in early adulthood when perceptions of invulnerability are strongest. Of course, this does not mean that young adolescents are necessarily competent at identifying and judging risk. As Millstein and

Halpern-Felsher (2001) point out, most studies report age-related increases in awareness and consideration of risk, with adults showing more competence than adolescence. But the authors conclude that young adolescents feel more vulnerable than older adolescents; and that adolescents feel more vulnerable than adults.

Developmental Approach

Hence it would appear that there is still much to learn about optimism bias, its developmental variation, and its putative link to risk behavior. A second tradition of research on adolescent invulnerability has its source in developmental theory. Our approach to studying invulnerability is rooted here in this tradition and, indeed, developed quite independently of the cognitive biases tradition described earlier.

Lapsley (1993) has developed an integrated theory of ego development that carves out a role for *personal fables* in the normative process of separation-individuation. This conceptualization views personal fable ideation not as an outcome of cognitive egocentrism but rather as an adaptive response to the demands of adolescent ego development (Lapsley, 1993; Lapsley & Rice, 1988). According to this view, an inflated sense of personal uniqueness, omnipotence and invulnerability are attempts by the adolescent to maintain the boundaries, integrity and cohesiveness of the self as the adolescent wrestles with the second phase of separation-individuation (e.g., Blos, 1962). Thus described personal fable ideation is identical to the narcissistic restitution strategy described by Blos (1962, p. 98), whereby the adolescent's newly keen perception of inner life, and his or her "willful creation of ego states of a poignant internal perception of the self," leads to a heightened sense of uniqueness, indestructibility and personal agency.

Hence, according to this view, invulnerability is not so much a cognitive error but a narcissistic adaptation to a normative developmental task. Although it should be associated with risk behavior, there is every expectation that it should also be associated with positive developmental purposes. Our attempt to pursue these questions necessitated a renewed emphasis on developing a new assessment strategy. Hence, our attempt to provide a new theoretical grounding for invulnerability (and other "personal

fables) was bootstrapped to efforts to derive the Adolescent Invulnerability Scale to measure it. In this paper we report briefly on the evolution of this research program.

First Clues

The initial study (Aasima, Lapsley & Flannery, in press) that launched the research program utilized a measure of personal fable ideation (New Personal Fable Scale) in a sample that included 94 sixth-graders, 223 eighth-graders, 142 tenth-graders, and 102 twelfth-graders, for a sample total of 561 participants. The New Personal Fable Scale included subscales that measured the fables of omnipotence, invulnerability and personal uniqueness. In addition, we included a measure of delinquent risk behavior (Rowe, 1985) that included such things as vandalism, fighting, stealing, trespassing and driving recklessly fast. We also measured lifetime usage and frequency of substance use (including tobacco, marijuana, beer, and various “hard” drugs). In addition to externalizing behavior we measured depressive symptoms and suicidal ideation, and various aspects of positive adjustment, including mastery coping and self-worth. Finally, we included a measure of narcissism in order to examine our developmental intuition that personal fable ideation was partly a narcissistic phenomena.

The results showed that 8th and 10th-graders reported more invulnerability than did 6th-graders. Moreover, as expected, felt invulnerability was a significant predictor of a variety of risk behaviors ($r = .44$), including the use of tobacco, beer and other controlled substances ($r = .20$ s). Although there was a significant increase in reported invulnerability between early to middle adolescence, there was no developmental variation in the bivariate relationship between invulnerability and risk behaviors. Indeed, the correlation between invulnerability and risk behaviors was consistently moderate in all four grades sampled here. It should be noted also that invulnerability did not operate solely as a risk factor in these data. Invulnerability also predicted, albeit less strongly, certain features of positive mental health, including self-worth, mastery coping, and superior adjustment. Finally, invulnerability was moderately correlated ($r = .47$) with narcissism. Table 1 reports partial correlations (controlling age) among the various measures.

This study documented, then, a number of promising findings: (1) It demonstrated age differences in invulnerability, at least from early to middle adolescence; (2) It showed that invulnerability was indeed a moderate predictor of general delinquent behavior; (3) It showed that invulnerability was a significant predictor of health risk behavior (smoking, drugs and alcohol), although the prediction here is not as robust as for general risk behavior (a finding that will recur); (4) It showed that invulnerability also predicted various aspects of positive adjustment, and does not function invariably as a risk factor; (5) It showed that invulnerability was moderately related to narcissism, giving support to developmental theories that do link these constructs.

We also concluded that this study does not support the notion of a singular “personal fable” construct. Consequently, we deemed it necessary to develop separate assessments of each personal fable in order to bear the new theoretical questions that are now put to the constructs.

Scale Development and Initial Validation

The development of the AIS followed standard scale development procedures. In Phase I an item pool of 56 items was generated by a team of seven late adolescent volunteers. This list was edited for duplicates and grammatical consistency, yielding a final list of 25 candidate items. In Phase II, this list was evaluated by four expert raters, who included a general expert on adolescent development, two nationally visible experts on allied constructs (sensation-seeking and narcissism), and a pioneer in the assessment of personal fable ideation. On the basis of expert commentary three invulnerability items were deleted and 12 were re-written, yielding a 22-item scale.

In the third phase of scale development (Duggan, Lapsley & Norman, 2000) the revised Adolescent Invulnerability was administered to a sample of 228 late adolescents ($M_{\text{age}} = 21.85$) in order to determine a parsimonious factor structure, and to derive estimates of internal consistency and construct validity. Exploratory factor analysis (extracting principal components) revealed two factors. One factor ($\alpha = .85$, 12 items) appeared to represent felt invulnerability to external danger, and was

therefore labeled “danger invulnerability.” The second factor ($\alpha = .79$, 9 items) appeared to represent an invulnerability to psychological distress, and was therefore labeled “psychological invulnerability.” The total AIS scale also demonstrated strong internal consistency ($\alpha = .87$). Duggan et al. (2000) showed, too, that the total AIS score was significantly and positively correlated with risk behaviors ($r = .41$), as were the “danger invulnerability” ($r = .43$) and “psychological invulnerability” ($r = .26$) sub-scales. This supports, of course, the hypothesized relationship between felt invulnerability and the tendency to engage in risk behaviors. Moreover, males reported more feelings of invulnerability than did females. The scale items and factor loadings are reported in Table 2.

In this study the invulnerability measures reported strong evidence of internal consistency, a meaningful and interpretable factor structure, and preliminary, but encouraging, construct validity.

A Study of Early Adolescents

In our next study we wanted to explore the measurement properties of the AIS in a sample of young adolescents (Lapsley & Duggan, 2001). We also wanted to determine whether felt invulnerability would also predict risk behaviors in this sample, including use of substances, and whether felt invulnerability was associated with internalizing symptoms and indices of positive adjustment. This latter question was motivated by theoretical considerations. Lapsley (1993) has argued that “personal fable” ideation might play a dual role in adolescent development. Although such ideation might dispose the adolescent to engage in grandiose risk-behaviors, it might also fortify the adolescent against depressive affect, and even be associated with the sort of “positive illusions” that social psychologists have associated with positive mental health (e.g., Taylor & Brown, 1988).

Participants included 248 early adolescents (117 males, 131 females) from a Midwestern suburban middle school. The mean age was 13.19 years ($SD = .82$). In addition to the Adolescent Invulnerability Scale we include the measure of delinquent risk behavior; the measures of tobacco, drug and alcohol use; a measure of depressive symptoms; and the

mastery coping and superior adjustment scales from the Self-Image Questionnaire for Young Adolescents.

A principal components factor analysis was performed on the AIS. The scree criterion suggested two factors, but three factors were indicated by the parallel analysis criterion (Lautenschlager, 1989). A second factor analysis, with Varimax rotation, extracted three factors, accounting for 46% of the variance. The first factor ($\alpha = .83$, 9 items) appeared to represent “general invulnerability” to psychological distress. The second factor ($\alpha = .76$, 6 items) appeared to represent “danger invulnerability.” The third factor ($\alpha = .72$, 6 items) appeared to represent an invulnerability to social disappointment or threat, and was labeled “interpersonal invulnerability.” The total scale also showed strong internal consistency ($\alpha = .86$). Item factor loadings are reported in Table 3.

Table 4 reports the correlation among the AIS subscales and indices of risk behaviors, depressive symptomatology and positive adjustment. As might be expected, the total AIS score is positively correlated with risk behaviors ($r = .33$) and with the lifetime ($r = .18$) and frequency ($r = .17$) of substance use. But adolescent invulnerability is also positively correlated with mastery and coping ($r = .21$). Table 4 also suggests that it is “danger invulnerability” that is most associated with substance use, while delinquent risk behaviors are more associated with “general” and “interpersonal invulnerability.” Note, too, that all three subscales of the AIS are all positively correlated with mastery and coping to about the same degree. Finally, two aspects of adolescent invulnerability, general and interpersonal, are negatively correlated with depressive affect, particularly interpersonal invulnerability ($r = -.22$). Moreover, the AIA was significantly correlated with risk behaviors, but also with certain aspects of positive adjustment as well, a pattern that also replicates findings reported by Duggan et al (2000).

An examination of the factor structure of the AIS revealed an interesting variation from previous research. In the Duggan et al. (2000) study, for example, the AIS was found to be composed of two factors, “danger” and “psychological” invulnerability. In the present study, however, three factors were evident. One factor was also denoted “danger”

invulnerability, as in the previous study. But here a more “general” invulnerability was evident, denoting a pervasive belief in one’s inability to be hurt, injured, bothered or harmed, either for physical (“I’m unlikely to be injured in an accident;”) or psychological (“My feelings don’t get hurt”) reasons. The adolescent generally believes, too, that “the problems that happen to people my age are unlikely to happen to me.”

In addition to danger and general invulnerability factors, the present study also revealed a third factor, denoted as “interpersonal invulnerability.” This factor reflected a belief that gossip, the opinions of others, and what “other people say” has no effect and cannot hurt the self. This factor was not evident in previous studies of older adolescents, and its presence here, among middle school youngsters, perhaps reflects the greater peer focus of younger teens relative to older adolescents.

The three invulnerability factors showed an interesting, differential pattern of correlations with risk behaviors, depression and positive adjustment. For example, lifetime usage of substances, and frequency of substance use, is significantly and positively correlated with “danger” invulnerability, but is uncorrelated with either “general” invulnerability or “interpersonal” invulnerability. Moreover, delinquent risk behaviors is more strongly correlated with “general” invulnerability than with danger or interpersonal invulnerability, although the latter two dimensions also modestly predict the tendency to engage in risk behaviors. Finally, interpersonal invulnerability appears to counterindicate depressive affect more than the other invulnerability factors.

Hence this study shows that adolescent felt invulnerability is not a unidimensional construct. The three dimensions of invulnerability have different implications for understanding adolescent behavior and adjustment:

- Danger invulnerability is more uniformly predictive of drinking, drug use and smoking.
- General invulnerability is more strongly predictive of delinquent risk behavior.

- Interpersonal invulnerability more strongly counterindicates depressive affect.

Moreover, the present data also shows that adolescent invulnerability, in all of its forms, is positively associated with mastery and coping. Hence, not only is adolescent invulnerability differentially related to problematic aspects of adolescent development (risk behaviors, drinking, drugs and smoking, depressive affect), it also appears to be related to positive aspects of development as well. This supports the claim that certain kinds of “personal fables” have a differentiated relationship to mental health and adjustment in adolescence.

In sum, this study showed that the AIS is a promising measure of adolescent felt invulnerability. It shows strong evidence of internal consistency and, within the limits of the measures used to date, evidence of construct validity as well. This study showed, too, that felt invulnerability is not a unidimensional variable with uniform implications for mental health. It would be inappropriate, for example, to conclude that adolescent invulnerability is invariably a menace to the adjustment of teenagers. Indeed, the present study shows that the various dimensions of invulnerability either counterindicate depression or else predict an orientation towards mastery and coping.

The Halpern-Felsher Studies

The AIS is part of the battery of measures used by Halpern-Felsher in her longitudinal studies of adolescent health risk behavior. In the initial study a sample of 212 young adolescents ($M_{\text{age}} = 14$) responded to the AIS along with survey questions concerning substance use. Our goal here was to explore further the psychometric properties of the AIS; determine the viability of the two- and three-factor solutions using a confirmatory factor analytic approach; and establish the relationship between the AIS and substance use in this sample of early adolescents.

As Table 5 indicates, the internal consistency various subscales is satisfactory, although danger invulnerability is most reliable in the two-factor solution. The total scale internal consistency was $\alpha = .83$.

The two- and three-factor solutions were then subjected to confirmatory factor analysis. Table 6 reports a summary of various fit indices. All fit indices for the two models were excellent when compared to standard criteria. However, as can be seen by inspection of the various indices, there were negligible differences in the fit of the two models. The two factor model might be chosen from the aspect of parsimony, although the three-factor model might be utilized for particular research questions.

Table 7 reports the correlation between the invulnerability scales and indices of substance use (tobacco, marijuana and alcohol). Only significant correlations are noted. As can be seen, danger invulnerability is consistently and positively correlated with indices of substance use, a pattern that replicates findings reported earlier. Moreover, the magnitude of the correlation between danger invulnerability and substance use reported in Table 7 is approximately the same as reported in Table 4. This illustrates once again that invulnerability is a multi-dimensional construct with differentiated outcomes for risk behavior.

Finally, in a 6-month follow up, the test-retest correlation among the invulnerability measures was $r = .60s$, with a similar pattern of correlations evident with indices of substance use.

Discussion

In this paper we summarized a line of research that treats invulnerability as a dispositional construct with differentiated implications for risk behavior and adaptation. We assume that invulnerability is a concomitant of normative developmental processes rather than being a cognitive error or general bias in how individuals assign subjective probabilities to negative events. We assume, for example, that invulnerability functions as a narcissistic adaptation to the challenges that attend separation-individuation, although these developmental claims have not been tested adequately.

Our understanding of invulnerability as a dispositional quality with developmental sources led us to an assessment strategy quite different than

the more common assessment of invulnerability that treats it as a species of optimism bias. To that end we have been developing an Adolescent Invulnerability Scale as a way to track individual differences. In the studies summarized here we have shown a number of surprising findings. We have shown that invulnerability may take different forms, with different implications for understanding risk behavior. Danger invulnerability, for example, is a pervasive predictor of substance use. General invulnerability is a stronger predictor of general delinquent behavior than it is of substance use. Interpersonal invulnerability counterindicates depressive symptoms. Indeed, in our earliest study we showed not only that invulnerability was a strong predictor of delinquent behavior and substance use (and a stronger predictor of delinquent behavior than substance use) but that invulnerability also predicted mastery coping as well.

Hence invulnerability is not only multi-dimensional, but it might also play a dual role in adolescent development. It predicts risk behavior, as long suspected, but it may also underwrite processes crucial to positive adaptation as well. It is doubtful that this more nuanced view of invulnerability would have been possible if we had continued to treat invulnerability simply as a cognitive bias in statistical reasoning.

Longitudinal research using the AIS is continuing. Moreover, we are pursuing studies that attempt to integrate optimism bias methods with the AIS assessment; and to continue to document the dual function of invulnerability in adolescent development.

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Table 1: Aaslma, Lapsley & Flannery (in press)**Partial Correlations Among Indices of Personal Fable Ideation, Narcissism and Adjustment**

Adjustment Variables	Personal Fables			Narcissism
	Omnipotence	Invulnerability	Uniqueness	
Externalizing				
Risk Behaviors	.09	.44*	.03	.24*
Drug Frequency	-.14*	.21*	.09	.04
Lifetime Drug Use	-.09	.23*	.10*	.11*
Internalizing				
Depression	-.52*	-.13*	.33*	-.29*
Suicidal Ideation (ZIPS)	-.27*	-.01	.27*	-.10*
Suicidal Ideation (CES-D)	-.37*	-.07	.25*	-.20*
Suicidal Ideation (SBQ)	-.34*	-.02	.30*	-.12*
Positive Adjustment				
Mastery Coping	.57*	.29*	-.23*	.44*
Superior Adjustment	.58*	.17*	-.12*	.47*
Self-Worth (6 th -8 th grades)	.55*	.16*	-.23*	.34*
Self-Worth (10 th -12 th grades)	.58*	.26*	-.34*	.40*
Narcissism	.67*	.47*	-.03	--

*p < .05

Table 2		
Scale Items, Factor Loadings and Internal Consistency (Duggan et al., 2000)		
Scale Items	Danger Invulnerability $\alpha = .85$	Psychological Invulnerability $\alpha = .79$
Safety rules do not apply to me.	.732	.104
Taking safety precautions is far more important for other people than it is for me.	.699	.099
I'm unlikely to get hurt if I did a dangerous thing.	.698	.037
Driving very fast wouldn't be very dangerous if I were driving	.676	.086
Nothing can harm me.	.658	.190
I could probably drink and drive without getting into an accident	.592	-.008
There are times when I think I am indestructible	.587	.080
Special problems, like getting an illness or disease, are not likely to happen to me.	.568	.216
The problems that happen to people my age are unlikely to happen to me.	.564	.264
It is not necessary for me to worry about being injured or harmed.	.548	.307
I'm unlikely to be injured in an accident.	.528	.186
Nothing bad will happen to me when I go to a place by myself.	.457	.331
The opinions of other people just don't bother me.	.147	.773
What people say about me has no effect on me at all.	.103	.748
Nothing seems to bother me.	.205	.722
My feelings don't get hurt.	.257	.705
It is just impossible for people to hurt my feelings.	.019	.610
I feel very badly when I know there is gossip about me (R)	-.035	.478
I'm a fragile person (R)	.188	.477
I don't get hurt.	.448	.449
My feelings are easily hurt (R)	.091	.413

Scale Item	Factors		
	1	2	3
I don't get hurt	.758	.005	.175
I'm unlikely to be injured in an accident	.705	.000	.194
Nothing bad will happen to me when I go to a place by myself	.621	.206	.131
Nothing can harm me.	.613	.367	.192
Nothing seems to bother me.	.604	.002	.373
My feelings don't get hurt.	.595	.004	.464
It is not necessary for me to worry about being injured or harmed	.593	.340	.132
The problems that happen to people my age are unlikely to happen to me.	.578	.182	.003
There are times when I think I am indestructible.	.446	.207	.133
Safety rules do not apply to me.	.003	.712	.208
I could probably drink and drive without getting into an accident	.115	.708	-.002
Driving very fast wouldn't be dangerous if I were driving.	.006	.677	.003
Taking safety precautions is far more important for other people than it is for me.	.168	.652	.001
I'm unlikely to get hurt if I did a dangerous thing.	.243	.544	.149
Special problems, like getting an illness or disease, are not likely to happen to me	.418	.437	.001
My feelings are easily hurt (R)	.007	.008	.719
I'm a fragile person (R)	.002	.005	.648
What people say about me has no effect at all.	.324	.005	.627
I feel badly when I know there is gossip about me (R)	-.005	.001	.611
The opinions of other people just don't bother me.	.383	.003	.496
It is just impossible for people to hurt my feelings.	.321	.315	.452
Adolescent Invulnerability Scale (21 items):	$\alpha = .86$		
Factor 1: General Invulnerability (9 items):	$\alpha = .83$		
Factor 2: Danger Invulnerability (6 items):	$\alpha = .74$		
Factor 3: Interpersonal Invulnerability (6 items):	$\alpha = .72$		

Other Measures	Total AIS	AIS Subscales		
		General	Danger	Interpersonal
Depression	.12	-.13*	.07	-.22**
Risk Behavior	.33**	.29**	.16*	.20**
Lifetime Substance Use	.18**	.11	.36**	.06
Frequency Substance Use	.17**	.10	.28**	.03
Mastery Coping	.21**	.23**	.28**	.24**
Superior Adjustment	.01	-.01	-.06	.08

	Two-Factor Solution		Three-Factor Solution		
	Danger (12 items)	Psychological (9 items)	General (9 items)	Danger (6 items)	Interpersonal (6 items)
$\alpha =$.75	.82	.76	.63	.76

AIS Model	Chi-square	df	NFI	RFI	IFI	TLI	CFI	Parsimony Ratio
2-Factor Model	476.29	188	.954	.943	.971	.965	.971	.814
3-Factor Model	56.10	187	.950	.938	.967	.960	.967	.810

Substance Use	Two-Factor Solution		Three-Factor Solution		
	Danger (12 items)	Psychological (9 items)	General (9 items)	Danger (6 items)	Interpersonal (6 items)
Tobacco					
few puffs	.21	--	--	.28	--
whole cigarette	.15	--	--	.23	--
cigar	.35	--	.24	.36	.16
at school	.25	--	--	.25	--
Used Pot	.18	--		.23	--
Alcohol					
Few sips	.18	--	--	.26	--
at least on drink	.22	--	--	.31	--