Original Contributions

Protecting Adolescents From Harm

Findings From the National Longitudinal Study on Adolescent Health

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Context.—The main threats to adolescents' health are the risk behaviors they choose. How their social context shapes their behaviors is poorly understood.

Objective.—To identify risk and protective factors at the family, school, and individual levels as they relate to 4 domains of adolescent health and morbidity: emotional health, violence, substance use, and sexuality.

Design.—Cross-sectional analysis of interview data from the National Longitudinal Study of Adolescent Health.

Participants.—A total of 12 118 adolescents in grades 7 through 12 drawn from an initial national school survey of 90 118 adolescents from 80 high schools plus their feeder middle schools.

Setting.—The interview was completed in the subject's home.

Main Outcome Measures.—Eight areas were assessed: emotional distress; suicidal thoughts and behaviors; violence; use of 3 substances (cigarettes, alcohol, marijuana); and 2 types of sexual behaviors (age of sexual debut and pregnancy history). Independent variables included measures of family context, school context, and individual characteristics.

Results.—Parent-family connectedness and perceived school connectedness were protective against every health risk behavior measure except history of pregnancy. Conversely, ease of access to guns at home was associated with suicidality (grades 9-12: $P<.001$) and violence (grades 7-8: $P<.001$; grades 9-12: $P<.001$). Access to substances in the home was associated with use of cigarettes ($P<.001$), alcohol ($P<.001$), and marijuana ($P<.001$) among all students. Working 20 or more hours a week was associated with emotional distress of high school students ($P<.01$), cigarette use ($P<.001$), alcohol use ($P<.001$), and marijuana use ($P<.001$). Appearing "older than most" in class was associated with emotional distress and suicidal thoughts and behaviors among high school students ($P<.001$); it was also associated with substance use and an earlier age of sexual debut among both junior and senior high students. Repeating a grade in school was associated with emotional distress among students in junior high ($P<.001$) and high school ($P<.01$) and with tobacco use among junior high students ($P<.001$). On the other hand, parental expectations regarding school achievement were associated with lower levels of health risk behaviors; parental disapproval of early sexual debut was associated with a later age of onset of intercourse ($P<.001$).

Conclusions.—Family and school contexts as well as individual characteristics are associated with health and risky behaviors in adolescents. The results should assist health and social service providers, educators, and others in taking the first steps to diminish risk factors and enhance protective factors for our young people.
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NUMEROUS REPORTS have documented the health status of youth in the United States, concluding that the main threats to adolescents' health are predominantly the health-risk behaviors and choices they make.[1-18] Data indicate that more than 3 of every 4 deaths in the second decade of life are caused by social morbidities: unintentional injuries, homicides, and suicides. Juvenile homicide rates have continued to escalate until recently,[17] and suicide rates among adolescents aged 14 years or younger have increased by 75% over the past decade.[3] Cigarette smoking among teenagers has increased by as much as 2% per year since 1992, when 19% of high school seniors reported smoking. Marijuana use has increased in each of the last 3 years among 8th-, 10th-, and 12th-grade students.[19]

For editorial comment see p 864.

Some children who are at high risk for health-compromising behaviors successfully negotiate adolescence, avoiding the behaviors that predispose them to negative health outcomes; while others, relatively advantaged socially and economically, sustain significant morbidity as a consequence of their behaviors. These issues of vulnerability and resilience have stimulated an interest in the identification of protective factors in the lives of young people—factors that, if present, diminish the likelihood of negative health and social outcomes.[20-26] Of the constellation of forces that influence adolescent health-risk behavior, the most fundamental are the social contexts in which adolescents are embedded[20]; the family and school contexts are among the most critical. Yet, how adolescents' connections to these contexts shape their health-risk behaviors is poorly understood.

In the present analysis we seek to identify particular risk and protective factors at the school, family, and individual levels as they relate to 4 broad domains critical to adolescent health and morbidity (emotional health, violence, substance use, and sexuality), using data collected as part of the National Longitudinal Study of Adolescent Health (Add Health).

Table 1.—Dependent Variables

Variables	Select Descriptors of Variables	No. of Items Constituting Variable (Reliability Coefficient)
Emotional distress	In the past week or past year: felt depressed, lonely, sad, or fearful, moody, cried, or had a poor appetite	17 (α=.87)*
Suicidality	In the past year: seriously thought about committing suicide or attempted 1, 2, or more times	2
Violence	In the past year: had a physical fight, injured someone, was in a group fight, threatened someone with a weapon, used a weapon in a fight, or shot or stabbed someone	8 (α=.82)*
Substance use Cigarette use	A 7-category composite variable from never smoked to smoked >1 pack/d	4
Alcohol use	Frequency: an 8-category variable from never/almost never to daily/almost daily used alcohol	2
Marijuana use	A 7-category composite variable from never used to used marijuana $\geq$ 6 times in past month	3
Sexual behaviors Age of sexual debut	Age at first intercourse: a continuous variable, with nonsexually active youth handled as event not having occurred	1
Pregnancy history	Among sexually experienced females $\geq$15 y, those who ever reported a history of pregnancy; dichotomous yes/no variable	1

*For most measures including 3 or more items, Cronbach[29] α coefficient was used to assess internal consistency.

METHODS

The Add Health Design

Add Health is a longitudinal study of adolescents in grades 7 through 12 and the multiple social contexts in which they live. The primary sampling frame included all high schools in the United States that had an 11th grade and at least 30 enrollees in the school (N=26 666). From this a systematic random sample of 80 high schools was selected proportional to enrollment size, stratified by region, urbanicity, school type, and percentage white. For each high school, the largest feeder school (typically a middle school) was also recruited when available. Overall, 79% of the schools contacted agreed to participate, for a final sample of 134 schools. Schools varied in size from fewer than 100 to more than 3000 students.

The schools provided a roster of all enrolled students and 96% (n=129) hosted a confidential in-school survey from September 1994 to April 1995. The survey was completed by 90 118 of 119 233 eligible students in grades 7 through 12. The in-school survey was administered only once, in year 1. Survey data will be the subject of future reports.

School administrators also completed a half-hour self-administered questionnaire yielding information on the provision of health services, school policies, school environments, and characteristics. Two phases of school administrator data were collected 1 year apart, beginning in year 1. A total of 130 administrator questionnaires were completed in year 1 and are included in this analysis.

The Main In-Home Sample

From students on the school rosters as well as students who were not on an enrolled roster but who completed an in-school questionnaire, a random sample of 15 243 adolescents stratified by grade and sex was selected for in-home interviews; 12 118 (79.5%) completed the 90-minute interviews. Of these, 75% had completed an in-school questionnaire.

The first phase of in-home interviews was conducted between April and December 1995 and is the focus of this report. A second phase was collected a year later. Data collected during the in-home phase of Add Health provide information on sensitive health-risk behaviors such as drug and alcohol use, sexual behavior, and criminal activities in addition to detailed information on health status, health service utilization, family dynamics, peer networks, romantic relationships, decision making, aspirations, and attitudes. During the more sensitive portions of the interview, adolescents listened to questions through earphones and directly entered their responses into a laptop computer, thereby greatly reducing any potential for interviewer or parental influences on their responses.

For 85.6% of the participating adolescents, a parent (in most instances a mother) also completed a half-hour interview in year 1. Parent interview data are not included in this article.

Through a set of linked identifiers—the in-school and in-home data sets and the school administrator and parent surveys—school administrator and parent surveys were merged. Extensive pre-cautions were taken to maintain confidentiality and to guard against deductive disclosure of participants' identities. All protocols received institutional review board approval. More detailed methodologic information is available in a separate article.[27]

Analysis and Reporting

A series of checks for invalid and inconsistent responses resulted in deletion of 546 (4.5%) of the core sample of 12 118 adolescents. Each case in the core sample was assigned a weight based on the sampling design so that the sample is nationally representative of US adolescents in grades 7 through 12. These sample weights were used in every statistical procedure with the exception of Cox regression (which does not permit weighting in SAS).

The final sample of 11 572 adolescents was randomly partitioned into exploratory and validation samples of approximately equal size. Investigators identified theoretically relevant and empirically significant independent variables with the exploratory sample; confirmatory analyses were completed and results are reported for the validation sample. Separate analyses were performed for grades 7 and 8 and 9 through 12 except for pregnancy history, for which questions were restricted to females aged 15 years and older regardless of grade and age of first intercourse, which latter category included both sexes and all grades regardless of sexual experience. An analysis modeling age of first intercourse excluded sexually experienced youth who reported having intercourse before age 11 years (2.0% of the sexually experienced subsample) on the assumption they represented a distinct subgroup of youth who had been sexually abused or had participated in nonconsensual sex.[28]

Items used in the measurement of the dependent and independent variables were identified from a variety of standardized, validated instruments used in national and state surveys of adolescents. Dependent variables were selected to capture the major indexes of adolescent health and risk behaviors (Table 1).[29] Independent variables were derived from a resiliency framework, which posits that young people's vulnerability to health-compromising outcomes is affected by both the nature and number of stressors as well as the presence of protective factors that buffer the impact of those stressors (Tables 2 and 3). Adverse or successful outcomes are described as emanating from the interplay of environmental factors, familial factors, and individual characteristics.[30-38] Individual characteristics reflect both genetic predispositions (eg, the timing and tempo of puberty) and social and cognitive development variables

Table 2.—Generic Independent Variables

Variables	Select Descriptors of Variables	No. of Items Constituting Variable (Reliability Coefficient)
Family context		
Parent-family connectedness	Closeness to mother and/or father, perceived caring by mother and/or father, satisfaction with relationship to mother and/or father, feeling loved and wanted by family members	13 (α=.83)*
Parent-adolescent activities	No. of different activities engaged in with mother and/or father in past 4 wk (summed)	10 for mother 10 for father
Parental presence	A parent present: before school, after school, at bedtime, or at dinner (summed)	
Parental school expectations	Mother's and/or father's expectations for you to complete high school and college	2 (r=0.45)†
Family suicide attempts and/or completions	Suicidal attempts and/or completions by family members in the past 12 mo	2
School context		
School connectedness	Feel that teachers treat students fairly; close to people at school; feel part of your school	6 (α=.75)*
Student prejudice	On a 5-point scale, agreement that students in school are prejudiced	1
Attendance‡	Quasi-continuous variable (average daily attendance)	1
Dropout rate‡§	Estimated dropout rate by grade in school	6
School type‡§	Five categories: comprehensive public, magnet public, parochial, technical, other	9
Classroom size‡	Average size of class from ≤20 to ≥35	1
Master's degree‡	% of teachers with master's degree from ≤10% to ≥90%	1
College‡	Proportion of students who are college bound	1
Parent-teacher organization‡	% of parents involved with a parent-teacher organization, ranging from does not exist to ≥90%	1
Individual characteristics		
Self-esteem	On a 5-point scale (agree to disagree): good personal qualities, a lot to be proud of, like yourself, feel loved and wanted, as good as other people	10 (α=.86)*
Religious identity	Pray frequently, view self as religious, affiliate with a religion	3
Same-sex attraction or behavior§	Ever had same-sex romantic attraction or same-sex intercourse	3
Perceived risk of untimely death	Perceive self at risk for untimely death	1
Paid work ≥20 h/wk§	No. of hours per week worked for pay during school year	1
Self-report of physical appearance§	Appear older or younger than most age mates	1 each
Repeated a grade§	Repeated 1 or more grades	1
Grade point average	Available grades in English, math, history/social studies, and science in most recent reporting period	4

*For most measures including 3 or more items, Cronbach[29] α coefficient was used to assess internal consistency.
†Pearson correlation coefficient was used to assess reliability of 2-item measures where appropriate.
‡Derived from school administrator questionnaire.
§Item coded dichotomously, eg, yes/no, any/none.

(eg, self-image, future perspective). Longitudinal studies by both Werner and Smith[25] and Quinton and Rutter[39] have identified the role of environmental and familial contexts as well as individual characteristics in promoting heightened or diminished well-being among children who have experienced multiple life stressors.

In the present analysis, school characteristics (ie, school type, dropout rate, attendance rate, classroom size, teacher training, characteristics of student body), including "school connectedness"—a concept that emerges from the interactions of the individual with the school environment[40,41]—are used to represent a key environmental force in the lives of in-school youth. Familial factors incorporate 4 components: parent-family relationships (connectedness, shared activities, parental presence); norms and expectations for adolescent behavior (school achievement, sexual behaviors); parental modeling (family suicide involvement); and household features (access to weapons, substances).[30,31,37] Individual characteristics include such factors as employment, academic performance, and sexual orientation as well as self-belief components including religious identity and self-esteem.[25,39]

Independent variables within each context were divided into 2 sets: generic (those that were expected to be associated with every dependent variable, such as parent-family connectedness, school connectedness, and self-esteem) and domain-specific variables (those that applied to specific dependent variables such as household access to alcohol, school policies on fighting, and knowledge of condom use). In the present analysis, the selection of risk and protective factors was guided by an emphasis on variables that can be used for assessment or are amenable to prevention and intervention efforts.

All dependent and independent variables were standardized separately for each grade category to a mean of 0 and an SD of 1 before conducting the multivariate analyses, except for dichotomous variables and age at first intercourse. In the case of multi-item scales, individual items were standardized before summing items to form scales; summed-scale scores were restandardized to a mean of 0 and SD of 1. Consequently, parameter estimates can be interpreted as standardized β (with the exception of dichotomous variables); within any particular analysis, odds ratios and relative risks can be compared with each other for effect size.

Multivariate Analysis

Our analytic strategy was to highlight relevant variables, their measurement, and the interrelationships of variables within domains. This broad approach provides a foundation for future, more focused analyses. The impact of each of the 3 contexts (family, school, and individual characteristics) on each of the adolescent health and risk behaviors was assessed using multiple linear regression for the continuous and quasi-continuous outcome variables, logistic regression for pregnancy history, and Cox regression for age of sexual debut. Each of these analyses controlled for the effects of key demographic variables: sex, race, ethnicity, family structure, and

Table 3.—Domain-Specific Independent Variables

Variables	Select Descriptors of Variables	No. of Items Constituting Variable
Sexual behavior domain		
Perceived parental disapproval of adolescent sex	On a 5-point scale, perceived mother's and/or father's disapproval of their adolescent having sex at this time with anyone or a special person	2 (r=0.82)*
Perceived parental disapproval of adolescent contraception	On a 5-point scale, perceived mother's and/or father's disapproval of their adolescent using contraception at this time	2
Length of time since sexual debut	Interval, in months, between first intercourse and the current date	6
Effective contraceptive use with first/last sex	Use of oral contraceptive pills, Norplant, Depo-Provera, intrauterine device, condoms, or condoms plus female barrier method with first/last sex (response categories: neither, 1, or both occasions)	6
Substance use in connection with sex	Level of alcohol and other drug use involved with first/last sex	6 (α=.65)†
Sex in exchange for drugs or money‡	Ever given sex in exchange for drugs or money	1
Virginity pledge‡	Made public or written pledge to remain a virgin until marriage	1
Perceived benefits of sexual activity	On a 5-point scale (strongly agree to strongly disagree), having sex would relax you, give you physical pleasure, make you more attractive, make you less lonely	5 (α=.70)†
Perceived obstacles to contraceptive use	On a 5-point scale (strongly agree to strongly disagree), birth control is a hassle to use, too expensive, interferes with pleasure, requires too much planning ahead, conveys that you are looking for sex	7 (α=.82)†
Perceived susceptibility to pregnancy	On a 5-point scale (strongly agree to strongly disagree), perceived chance of getting pregnant after having unprotected sex on a single occasion in the near future	1
Perceived consequences of pregnancy	Pregnancy: one of the worst things that could happen at this time, would be embarrassing, would force growing up too fast	8 (α=.70)†
Condom use knowledge	Knowledge regarding correct use of condoms (summed)	No. correct of 5
Contraceptive use self-efficacy	Confidence in ability to use contraception or to refuse sex in various situations	3 (α=.65)†
School-based reproductive health services on premises‡§	Family planning counseling services, sexually transmitted disease treatment, or prenatal or postnatal services	4
Violence, emotional distress, and suicidality domains		
Household access to guns‡	Reported easy availability of a gun in the home	1
History of victimization and/or witnessing violence	Within the past 12 mo, witnessed or been a victim of a shooting or stabbing	5 (α=.66)†
Weapon carrying	Weapon carrying at school, in connection with substance use	4 (α=.74)†
Sale of illicit drugs	Any sale of illicit drugs within the past 12 mo	1
Involvement with deviant/antisocial behaviors	Destruction of property, theft, skipping school in past year; ever suspended or expelled from school	10 (α=.78)†
Body image	Perceived weight, from very underweight to very overweight	1
School policies on fighting§	Warning/minor action, suspension, or expulsion for fighting with or injuring a student or teacher or carrying a weapon at school	4
Mental health services at school‡§	Emotional counseling, rape counseling, or programs for dealing with effects of violence provided on school premises	3
Substance abuse domains		
Household access to cigarettes‡	Reported easy availability of cigarettes in the home	1
Household access to alcohol‡	Reported easy availability of alcohol in the home	1
Household access to illicit substances‡	Reported easy availability of illicit drugs in the home	1
School policies on smoking§	Warning/minor action, suspension, or expulsion for smoking at school	1
School policies on alcohol§	Warning/minor action, suspension, expulsion for possessing or drinking alcohol at school	2
School policies on illicit drugs§	Warning/minor action, suspension, expulsion for possessing or using drugs at school	2
Substance use programs at school‡§	Drug education, drug abuse, or alcohol abuse program	3

*Pearson correlation coefficient was used to assess reliability of 2-item measures where appropriate.
†For most variables including 3 or more items, Cronbach[29] α coefficient was used to assess internal consistency.
‡A dichotomously categorized variable, eg, yes/no, any/none.
§Derived from a school administrator questionnaire.

poverty status. In these analyses, race was categorized as black vs non-Hispanic white as the reference group; ethnicity as "other" ethnic group, which included subcategories of Hispanic (98% white, 2% black), Asian/Pacific Islander, American Indian, and "other" (1% designated 2 or more ethnic identities) vs non-Hispanic white as the reference group; family structure as 2 parents in the home vs 2 parents not in the home; and poverty status as 1 or more parents on welfare vs neither parent on welfare. While a simple indicator of poverty status, this designation has been shown to work with adolescent respondents.[42,43]

Because of the complex patterns of intercorrelation between variables from each of the 3 contexts, the total variance in each dependent variable explained by a combination of family, school, and individual context measures is typically less than the sum of the variances explained by each context analyzed independently.

To ensure adequate control for demographic effects, in the first step of analyses demographic variables were forced into regression equations and retained regardless of their statistical significance. In the second step of analyses, the set of generic independent variables was introduced; significant generic measures along with demographic variables were retained in subsequent regression models. In the third step of analyses, a set of domain-specific independent variables was introduced into regression models, and significant domain-specific measures were retained. In a fourth and final step, the models developed on the exploratory sample were cross-validated by recomputing parameter estimates on the vali-

Protecting Adolescents From Harm—Resnick et al

Demographic Variables	Risk Behavior							
	Emotional Distress*	Suicide Attempt (≥1)	Violence Perpetration*	Smoke ≥6 Cigarettes/d	Alcohol (Beer or Wine) Use ≥2 d/mo	Marijuana Use at Least Once in Past Month	Had Sex	Pregnancy History†
Grade								
7th-8th	17.7	3.7	9.2	3.2	7.3	6.9	17.0	11.8
9th-12th	18.4	3.6	7.8	12.8	23.1	15.7	49.3	19.4
Sex								
Male	15.7	2.1	11.0	10.0	20.1	13.5	39.9	...
Female	20.1	5.1	5.7	9.2	15.6	11.9	37.3	18.6
Geography								
Urban	18.6	3.5	9.0	6.9	14.9	11.1	37.7	22.4
Suburban	17.5	3.7	8.2	10.2	19.2	13.8	38.2	17.6
Rural	19.9	3.6	8.4	11.9	17.7	10.5	41.9	15.7
Region								
West	20.7	4.3	8.5	5.4	15.3	14.9	31.7	18.9
Midwest	20.4	4.2	8.4	12.8	18.4	15.0	38.0	18.9
Northeast	18.2	3.6	8.8	11.3	19.5	15.0	35.6	13.9
South	17.4	3.0	8.1	8.2	17.7	9.0	42.8	19.7
Poverty								
Parents receive welfare	23.2	4.7	13.0	10.2	16.1	15.3	44.9	24.0
Parents do not receive welfare	17.2	3.6	7.6	9.5	18.1	12.4	37.9	17.7

*Continuous variable reported as a mean score; higher score indicative of higher risk.
†Percentage of those who are sexually active.

Table 5.—Percent Variance in Dependent Variables Explained by Each Context Independently, After Controlling for Demographic Factors*

Dependent Variables	Demographic Factors†		Family Context		School Context		Individual Characteristics		3 Models and Demographics Combined‡	
	Grades 7-8	Grades 9-12	Grades 7-8	Grades 9-12	Grades 7-8	Grades 9-12	Grades 7-8	Grades 9-12	Grades 7-8	Grades 9-12
Emotional distress	4.2	5.9	14.6	13.5	17.6	13.1	21.8	21.0	30.0	27.1
Suicidality	1.0	1.2	4.8	7.0	3.1	3.0	2.5	5.9	7.1	9.9
Violence	6.6	8.0	6.5	4.6	7.1	5.8	43.9	49.6	44.4	50.6
Substance use										
Cigarette use	2.2	6.2	6.4	7.8	3.7	5.7	11.4	10.0	14.5	14.4
Alcohol use	1.0	2.9	8.5	6.1	5.6	4.3	7.1	7.3	13.7	12.5
Marijuana use	1.6	2.0	5.6	8.6	4.8	5.6	4.8	7.4	10.2	13.7

*For history of pregnancy and age of sexual debut, no R^2 available using logistic regression or Cox regression.
†The factors include poverty status, family structure, race, ethnicity, and sex.
‡Explanatory variables significant in the 3 context-specific analyses were retained in the combined analysis regardless of changes in significance due to intercorrelations among them.

dation sample, with all retained variables from the estimation analysis forced into the validation analysis. Thus, independent variables found in final models included the full set of demographic variables as well as generic and domain-specific measures that remained significant on cross-validation. For linear regression analysis, potential design effects resulting from the use of a cluster sampling design were adjusted with the use of a mixed-models linear regression procedure (SAS PROC MIXED)[44] with specified use of a block diagonal covariance structure.

RESULTS

Prevalence of Behaviors by Demographic Variables

The distribution of key risk behaviors in the national sample of adolescents is presented in Table 4. Prevalence data are presented by grade group, place of resi-dence, region, self-reported poverty status, and sex.

Emotional Distress and Suicidality.—Two indicators of risk to adolescents' emotional well-being were assessed: emotional distress (a recent history of physical and emotional symptoms of distress) and suicidality (a history of suicidal ideation and attempts in the past year). Overall, 87.4% (10 010/11 453) of adolescents indicated that they had neither suicidal thoughts nor attempts over the past year. A total of 10.2% of girls (599/5745) and 7.5% of boys (428/5708) reported having considered suicide without having attempted it over the past year, while 3.6% of all adolescents (415/11 453) (5.1% of girls [295/5745] and 2.1% [120/5708] of boys) reported suicide attempts. Of adolescents, 3.6% (412/11 438) reported a parental suicide attempt during the previous year, while 0.9% of the young people surveyed (103/11 438) reported suicide completions among their parents.

Family Context.—Family context variables explained 14% to 15% of the variability in emotional distress (9th-12th graders and 7th-8th graders, respectively) and 5% to 7% of the variability in suicidality for all adolescents (Table 5). The key aspect of family context that accounted for these relationships, after controlling for the influence of demographic factors, was parent-family connectedness (Table 6). The presence of parents at key times during the day (at waking, after school, at dinner, and at bedtime), shared activities with parents, and high parental expectations for their child's school achievement were also moderately protective against emotional distress for both younger and older adolescents. A recent family history of suicidality was associated with higher distress as well as adolescent suicidality.

Except for parent-family connectedness, no family context variables significantly protected against adolescent

Table 6.—Explaining Emotional Distress, Suicidality, and Violence (Parameter Estimates and *P* Values)*

Variables	Emotional Distress		Suicidality		Violence	
	Grades 7-8 (P Value)	Grades 9-12 (P Value)	Grades 7-8 (P Value)	Grades 9-12 (P Value)	Grades 7-8 (P Value)	Grades 9-12 (P Value)
Family	n=1785	n=3760	n=1790	n=3789	n=1787	n=3758
Parent-family connectedness	−.37 (<.001)	−.33 (<.001)	−.17 (<.001)	−.24 (<.001)	−.21 (<.001)	−.13 (<.001)
Parent-adolescent activities	.06 (<.01)	.04 (<.05)	...	...	...	...
Parental presence	−.07 (<.01)	−.06 (<.001)	...	...	...	...
Parental school expectations	−.07 (<.01)	−.08 (<.001)	...	...	...	−.07 (<.001)
Recent family suicide attempts/completions	.09 (<.01)	.07 (<.001)	.12 (<.001)	.06 (<.001)	.13 (<.001)	.07 (<.001)
Household access to guns†	...	...	...	.13 (<.001)	.14 (<.01)	.27 (<.001)
School	n=1800	n=3812	n=1788	n=3799	n=1792	n=3803
School connectedness	−.43 (<.001)	−.36 (<.001)	−.17 (<.001)	−.18 (<.001)	−.27 (<.001)	−.26 (<.001)
Perceived student prejudice	.06 (<.01)	.06 (<.001)	...	...	...	...
Individual	n=1754	n=3628	n=1768	n=3865	n=1769	n=3892
Self-esteem	−.38 (<.001)	−.38 (<.001)	...	−.21 (<.001)	...	...
Same-sex attraction or behavior	...	.23 (<.001)	...	...	...	...
Perceived risk of untimely death	.10 (<.001)	.14 (<.001)	.08 (<.001)	.06 (<.001)	.05 (<.01)	...
Paid work ≥20 h/wk†	...	.16 (<.001)	...	...	...	...
Appears older than most†	...	.17 (<.001)	...	.27 (<.001)	...	...
Appears younger than most†	.20 (<.01)	...	...	...	...	...
Repeated a grade†	.22 (<.001)	.12 (<.01)	...	...	...	...
Grade point average	−.14 (<.001)	−.07 (<.001)	−.12 (<.001)	...	−.07 (<.001)	...
History of victimization/witnessing violence	...	...	...	...	.30 (<.001)	.44 (<.001)
Weapon carrying	...	...	...	...	.18 (<.001)	.22 (<.001)
Deviant behavior	...	...	...	...	.26 (<.001)	.22 (<.001)
Drug selling†	...	...	...	...	.39 (<.001)	.11 (<.001)

*Ellipses indicates that the variables were excluded from the final model.
†Item coded dichotomously, eg, yes/no, any/none. Risk estimate compares reporting affirmatively to item with all others.

suicidality. However, having a gun easily available at home was slightly associated with suicidality for older adolescents. Overall, 24.2% of respondents (2771/11 468) reported that guns were easily accessible at home.

School Context.—School context had a limited but consistent influence on adolescent emotional health, accounting for 13% to 18% of the variability in emotional distress among older and younger adolescents, respectively, and 3% of the variability in suicidality (Table 5). School connectedness was associated with lower levels of emotional distress and suicidal involvement among both younger and older adolescents (Table 6). Perceived student prejudice was associated with emotional distress among both groups of students. No other aspect of the school environment was associated with either emotional distress or suicidality.

Individual Characteristics.—Individual characteristics accounted for 21% to 22% of the variability in emotional distress among students and for 3% to 6% of the variability in suicidality among 7th and 8th graders and 9th through 12th graders, respectively (Table 5).

Self-esteem was inversely related to emotional distress, regardless of grade (Table 6). Other factors associated with emotional distress, regardless of grade level, included: being held back 1 or more

grades in school, a low grade point average, and perceived risk of untimely death. Among 9th through 12th graders, emotional distress tended to be higher among those with same-sex attraction or behavior, those working 20 or more hours per week, and those who reported looking older than their peers. More emotional distress was reported by 7th and 8th graders who indicated looking "younger than most."

A smaller set of individual characteristics played a role in suicidality. Suicidality across grade cohorts was associated with a perceived risk of an untimely death. Low self-esteem and appearing older than one's peers was associated with suicidality among 9th through 12th graders, while a low grade point average showed significant association with suicidality among 7th and 8th graders.

Involvement in Violence.—Although most young people reported never having been the victim of violent behavior, 24.1% (2767/11 486) indicated they had been a victim. Additionally, 12.4% of students (1425/11 490) indicated that they had carried a weapon over the previous 30 days.

Family Context.—Controlling for demographic factors, family variables explained relatively little of the variability in violence perpetration, 7% and 5% among younger and older students, respectively (Table 5). Items associated with higher lev-

els of violence for all students included household access to guns and a recent history of family suicide attempts or completions (Table 6). Factors associated with somewhat lower levels of interpersonal violence included parental and family connectedness. In addition, higher parental expectations for school achievement were weakly associated with lower levels of violence among older adolescents.

School Context.—School context accounted for 6% to 7% of the variability in violence among students (Table 5). Specifically, higher levels of connectedness to school were associated with somewhat lower levels of violence, applicable to both student cohorts (Table 6).

Individual Characteristics.—Individual characteristics accounted for 44% of the variability in violent behavior among 7th and 8th graders and 50% of variability among 9th through 12th graders (Table 5). Among both younger and older adolescents, involvement in violence was associated with having been a victim or a witness to violence, frequency of carrying a weapon, involvement in deviant or antisocial behaviors, and involvement in selling marijuana or other drugs within the past year (Table 6). Among younger students, interpersonal violence was associated with lower grade point average and higher perceived risk of untimely death.

Table 7.—Explaining Substance Use (Parameter Estimates and P Values)*

Variables	Cigarette Use		Alcohol Use		Marijuana Use	
	Grades 7-8 (P Value)	Grades 9-12 (P Value)	Grades 7-8 (P Value)	Grades 9-12 (P Value)	Grades 7-8 (P Value)	Grades 9-12 (P Value)
Family	n=1760	n=3687	n=1785	n=3783	n=1776	n=3656
Parent-family connectedness	−.19 (<.001)	−.13 (<.001)	−.24 (<.001)	−.14 (<.001)	−.18 (<.001)	−.19 (<.001)
Parent-adolescent activities	. . .	−.04 (<.001)	. . .	. . .	. . .	. . .
Parental presence	. . .	−.06 (<.001)	. . .	−.13 (<.001)	−.07 (<.01)	−.08 (<.001)
Parental school expectations	. . .	−.05 (<.01)	. . .	. . .	. . .	. . .
Recent family suicide attempts/completions	.09 (<.01)	.04 (<.01)	. . .	. . .	. . .	. . .
Household access to substances†	.25 (<.001)	.38 (<.001)	.32 (<.001)	.22 (<.001)	.75 (<.001)	1.00 (<.001)
School	n=1768	n=3737	n=1785	n=3796	n=1773	n=3669
School connectedness	−.19 (<.001)	−.25 (<.001)	−.23 (<.001)	−.21 (<.001)	−.22 (<.001)	−.24 (<.001)
Individual	n=1705	n=3542	n=1721	n=3584	n=1735	n=3463
Self-esteem	. . .	−.11 (<.001)	−.08 (<.001)	−.05 (<.01)	. . .	−.09 (<.001)
Religious identity	−.07 (<.01)	−.08 (<.001)	−.06 (<.01)	−.11 (<.001)	. . .	−.10 (<.001)
Same-sex attraction or behavior†	. . .	. . .	. . .	−.19 (<.01)	. . .	.17 (<.05)
Perceived risk of untimely death	.11 (<.001)	. . .	.06 (<.01)	. . .	.10 (<.001)	.06 (<.001)
Paid work ≥20 h/wk†	. . .	.37 (<.001)	. . .	.33 (<.001)	. . .	.20 (<.001)
Appears older than most†	.33 (<.001)	.21 (<.001)	.38 (<.001)	.34 (<.001)	.20 (<.01)	.22 (<.001)
Repeated a grade in school†	.18 (<.01)	. . .	. . .	. . .	. . .	. . .
Grade point average	−.24 (<.001)	−.21 (<.001)	−.15 (<.001)	−.13 (<.001)	−.18 (<.001)	−.16 (<.001)

*Ellipses indicate that the variables were excluded from the final model.
†Dichotomously categorized variable, eg, yes/no, any/none. Risk estimate compares reporting affirmatively to item with all others.

Substance Use

Cigarette Use.—Overall, 25.7% of adolescents (2907/11 293) reported being current smokers, with 9.2% of females (524/5681) and 10.0% of males (563/5612) smoking 6 or more cigarettes per day.

Family Context.—Family context measures explained 6% to 8% of the variability in frequency of cigarette use among younger and older groups (Table 5). Variables associated with some increased frequency of cigarette use among both groups included easy household access to cigarettes and family history of recent suicidal behavior (Table 7). Nearly 1 in 3 respondents (31.4% [3602/11 468]) reported that cigarettes are easily available at home with little sex variability. High levels of connectedness to parents and family members were associated with somewhat less frequent cigarette use among both groups. Among 9th through 12th graders, less frequent cigarette use also had small but significant associations with more frequent parental presence in the home, greater number of shared activities between adolescents and their parents, and higher perceived levels of parental expectations related to adolescent school completion.

School Context.—School variables accounted for only 4% of the variability in cigarette use frequency among 7th and 8th grade students and 6% of the variability among 9th through 12th grade students (Table 5). Among both younger and older students, high self-reported levels of school connectedness were associated with less frequent cigarette use. No other school context variables were significantly associated with cigarette use (Table 7).

Individual Characteristics.—Individual characteristics explained 11% of the variability in cigarette use among 7th and 8th grade students and 10% of variability in this behavior among 9th through 12th graders (Table 5). Correlates of increased frequency of cigarette use among both student cohorts included appearing older than peers and low grade point average (Table 7). Correlates of use among younger students included high perceived risk of early death and having repeated a grade in school. Among older students, working 20 or more hours per week was associated with increased cigarette use. Items slightly associated with decreased frequency of cigarette use included high levels of personal importance placed on religion and prayer among all students and, among older students, high levels of self-esteem.

Alcohol Use

Overall 17.9% of students (2042/11 436) reported drinking alcohol more than monthly, with 9.9% (1129/11 436) drinking at least 1 day a week.

Family Context.—Family context variables accounted for 9% of the variability in frequency of alcohol use among 7th and 8th grade students and 6% of the variability among 9th through 12th grade students (Table 5). For both groups, easy household access to alcohol was associated with more frequent alcohol use (Table 7). As with cigarettes, alcohol was readily available in over a quarter (28.5% [3268/11 474]) of respondents' homes. High lev-els of connectedness to parents and family members were associated with less frequent alcohol use among both groups of students. Among older students, more frequent parental presence in the home was associated with less frequent use.

School Context.—School variables accounted for 4% to 6% of variability in frequency of alcohol use among students (Table 5). High levels of school connectedness were associated with less frequent alcohol use among both groups (Table 7).

Individual Characteristics.—Individual characteristics explained 7% of the variability in frequency of alcohol use among both groups of students (Table 5). Items associated with increased frequency of use for both younger and older students included self-report of appearing older than peers, low grade point average, and low self-esteem (Table 7). Among 9th through 12th grade students, increased alcohol use was also associated with working 20 or more hours per week and same-sex attraction or behavior. For 7th and 8th grade students, perceived risk of untimely death was associated with more frequent use. High levels of importance placed on religion and prayer appeared to be a significant protective factor among both groups.

Marijuana Use

One quarter of all young people (25.2% [8315/11 116]) reported ever having smoked marijuana, with 12.7% (1406/11 116) reporting that they had smoked at least once during the previous month. About 6% (670/11 116) of females and males were heavy users (using 4 or more times during the previous 30 days).

Protecting Adolescents From Harm—Resnick et al **829**

Table 8.—Predicting Sexual Behaviors (Parameter Estimate, *P* Value, 95% Confidence Interval [CI], and Relative Risk [RR] or Odds Ratio [OR])

| Variables | Age of Sexual Debut | Pregnancy History |
	Grades 7-12 RR* (95% CI)	Sexually Experienced Females ≥15 y OR* (95% CI)
Family	n=5017	n=909
Parent-family connectedness	0.85 (0.81-0.88)	. . .†
Recent family suicide attempts/completions	1.07 (1.03-1.12)	. . .
Perceived parent disapproval of adolescent sex	0.79 (0.75-0.83)	. . .
Perceived parent disapproval of adolescent contraception	0.75 (0.71-0.79)	0.65 (0.53-0.81)‡
Parental-adolescent activities	. . .	0.69 (0.56-0.85)
School	n=5177	n=1007
School connectedness	0.77 (0.74-0.81)	. . .
Average daily attendance	0.95 (0.91-0.99)¶	. . .
Parochial school‖	0.78 (0.63-0.97)¶	. . .
Individual	n=4982	n=863
Religious identity	0.93 (0.89-0.97)§	. . .
Same-sex attraction or behavior	1.39 (1.17-1.65)‡	. . .
Perceived risk of untimely death	1.11 (1.06-1.16)‡	. . .
Paid work ≥20 h/wk‖	1.36 (1.21-1.53)‡	. . .
Appears older than most‖	1.56 (1.38-1.78)‡	. . .
Pledge of virginity‖	0.25 (0.19-0.33)‡	. . .
Grade point average	0.80 (0.76-0.84)‡	. . .
Appears younger than most‖	0.83 (0.69-0.99)¶	. . .
Effective contraceptive use first/last sex	. . .	0.73 (0.60-0.88)§
Time since sexual debut	. . .	1.76 (1.41-2.19)‡
Perceived consequences of pregnancy	. . .	0.61 (0.51-0.73)‡

*Value <1 associated with decreased risk (increased age of sexual debut).
†Ellipses indicate that the variables were excluded from the final model.
‡*P*<.001.
§*P*<.01.
‖Dichotomously categorized variable, eg, yes/no, any/none. Risk estimate compares reporting affirmatively for item with all others.
¶*P*<.05.

Family Context.—Family context measures explained 6% to 9% of the variability in marijuana use among both groups of students (Table 5). More frequent marijuana use was associated with easy household access to illicit substances in both age groups (Table 7). High levels of parent-family connectedness were associated with less frequent marijuana use, as was a greater frequency of parental presence in the home.

School Context.—School variables explained 5% to 6% of the variability in marijuana use among students (Table 5). For both groups, high levels of school connectedness were associated with less frequent use. No other school factor was related to marijuana use (Table 7).

Individual Characteristics.—Individual characteristics accounted for 5% of variability in frequency of marijuana use among 7th and 8th graders and 7% among 9th through 12th graders (Table 5). Among both groups of students, appearing older than age mates, low grade point average, and perceived risk of untimely death were associated with more frequent marijuana use (Table 7). Among 9th through 12th grade students, working 20 or more hours per week and same-sex attraction or behavior were associated with greater use. Protective factors, evident among high school students only,

included personal importance placed on religion and prayer and high levels of self-esteem.

Sexual Behaviors

Approximately 17% (646/3788) of 7th and 8th graders and nearly half (49.3% [3754/7614]) of 9th through 12th graders indicated that they had ever had sexual intercourse.

Family Context.—Significant family factors associated with delaying sexual debut included high levels of parent-family connectedness, parental disapproval of their adolescent being sexually active, and parental disapproval of their adolescent's using contraception. Recent family suicide attempt or completion was associated with a slightly increased risk of early sexual debut (Table 8).

School Context.—Three factors were associated with some delay in sexual debut: higher levels of connectedness to school; attending a parochial school; and attending a school with high overall average daily attendance (Table 8).

Individual Characteristics.—Adolescents who reported having taken a pledge to remain a virgin were at significantly lower risk of early age of sexual debut (Table 8). Nearly 16% of females (911/5715) and 10% of males (539/5692) reported making such pledges. A higher

level of importance ascribed to religion and prayer was also associated with a somewhat later age of sexual debut, as was self-report of appearing younger than peers and a higher grade point average. Self-report of looking older than peers, working 20 or more hours per week, same-sex attraction or behavior, and perceived risk of untimely death were all associated with earlier sexual debut.

History of Pregnancy

Among sexually experienced females aged 15 years and older, 19.8% (369/1860) reported having ever been pregnant.

Family Context.—A greater number of shared activities with parents and perceived parental disapproval of adolescent contraceptive use were protective factors against a history of pregnancy.

School Context.—No school factors were associated with students' pregnancy histories.

Individual Characteristics.—A history of pregnancy was associated with length of time since age of sexual debut. Protective factors included perceived (negative) consequences of becoming pregnant and use of effective contraception at first and/or most recent intercourse.

COMMENT

The goal of this study has been to identify school, family, and individual protective factors and risk factors for major areas of adolescent morbidity. It is clear that when demographic characteristics are controlled, social contexts count. Specifically, we find consistent evidence that perceived caring and connectedness to others is important in understanding the health of young people today. While these findings are confirmatory of other studies, they are also unique because they represent the first time certain protective factors have been shown to apply across the major risk domains.

Family

With notable consistency across the domains of risk, the role of parents and family in shaping the health of adolescents is evident. While not surprising, the protective role that perceived parental expectations play regarding adolescents' school attainment emerges as an important recurring correlate of health and healthy behavior. Likewise, while physical presence of a parent in the home at key times reduces risk (and especially substance use), it is consistently less significant than parental connectedness (eg, feelings of warmth, love, and caring from parents). The home environment also plays a role in shaping negative health outcomes. If homes provide a venue in which adolescents have easy access to guns, alcohol,

tobacco, and illicit substances, adolescents are more likely to have an increased risk of suicidality, involvement in interpersonal violence, and substance use. In this context we note that restricting access to tobacco both within and outside the home is a focus of the recent surgeon general's report on smoking and health.[45] The present data support the importance of those recommendations. It supports the notion of restricting access to alcohol; those who grow up where alcohol is easily accessible may be more likely to drink as teens. And it supports the American Medical Association's recommendation[46] to remove guns from the home, as those with easy access to guns in the home were more likely to be violent and more likely to attempt suicide.

Hewlett[47] and Fuchs and Reklis[48] have identified the time deficit that surrounds many of the children of the United States: the increasing scarcity of time that parents have for their children, driven largely by workforce pressures. Compared with 1960, children in the United States have lost, on average, 10 to 12 hours per week of parental time.[48] The present study confirms the importance of time availability of parents for their children. While the monitoring function is important, time availability becomes critical in those variables that constitute family connectedness and parental activities. As economic and social policies press both parents into the workforce, consideration should be given to the sequelae for children when flexible time options are not made available.

School

Connectedness with school is another protective factor in the lives of young people. Indeed, other population-based studies have suggested that school connectedness, along with an adolescent's sense of connectedness to parents, family, and other adults, serves as a protective factor against a variety of risk behaviors.[23] Steinberg[49] has described how school engagement is a critical protective factor against a variety of risky behaviors, influenced in good measure by perceived caring from teachers and high expectations for student performance. While much emphasis is placed on school policies governing adolescent behaviors, such policies appear in the present analysis to have limited associations with the student behaviors under study.

Individual

A number of individual characteristics emerged as salient correlates of risky behaviors across a variety of domains in this analysis. In the sample, 17.9% (1366/7638) of 9th through 12th grade students reported working during the school year at least 20 hours per week. Greenberger and Steinberg[50] cautioned against adolescents' working long hours, focusing on the adverse consequences of fatigue as well as excessive leisure income. The present study affirms that 20 or more hours per week of work during the teenage years is associated with higher levels of emotional distress, substance use, and earlier age of sexual debut; although, as emphasized by Bachman and Schulenberg,[51] this association must be examined longitudinally.

Low grade point average and being retained in school were related by varying degree to higher levels of emotional distress, substance use, involvement in violence, and earlier onset of sexual intercourse. Byrd and colleagues[52] have reported that after adjusting for multiple potential confounding variables, old-for-grade high school students were significantly more likely to be involved in a multiplicity of risky behaviors. The prevalence of adolescents who are retained at least 1 year (21.3% [2462/11 561]) and the associated health-risk behavior problems suggest that targeted strategies for all young people who have school-related learning and behavior problems warrant closer examination. Consistently, it appears that those who are academically at risk are at high risk in other ways as well. The "full-service school" as a community-based vehicle for organization and delivery of educational, social, and health services provides an excellent framework for community planning and action to address the health and educational needs of young people who are highly distressed and engaged in serious health-compromising behaviors.[53]

To be "out of sync" for grade level is clearly a risk factor but so too is perceiving oneself as physically older than age mates independent of one's chronological age. These findings are consistent with those of Brooks-Gunn and Peterson[54] and Peterson and Crockett.[55] The present analyses indicate that not only did those who perceived themselves as looking older than peers initiate intercourse at a younger age, but they were also more likely to use cigarettes, alcohol, and marijuana. They were also significantly more likely to have participated in violence and to have expressed emotional distress and suicidality than adolescents who saw themselves as looking age-appropriate. Except for emotional distress, the same behavioral vulnerabilities were not seen in general for those who reported appearing younger than their age. To be out of sync from peers, thus, appears to put a young person at risk. While perceived difference from age mates can be explored with adolescents during preventive health assessments and physical examinations, such perception does not lend itself to direct preventive or intervention efforts.

Among the nearly 88% (9945/11 326) of the population who reported having a religion, the perceived importance of religion and prayer was protective. Those who ascribed importance to religion and prayer tended to have a later age of sexual debut and were also less likely to use all substances. This is consistent with other studies of risk and protective factors that link religiosity, spirituality, and religious identity with "conventional" behaviors.[23,56] While the work of Werner and Smith[25] suggests that religiosity would also be protective against emotional distress, there is nothing in the present study to support that finding.

It is tempting to compare our prevalence data for major adolescent risk behaviors with other national school-based data sets such as the Youth Risk Behavior Survey.[45] However, such direct comparisons should be undertaken with care. Each data set uses particular approaches to measurement (ie, single-item vs multi-item indicators), and, more importantly, there are branching patterns in the questionnaires that lead to different results. For example, 1 instrument asks all respondents questions about suicide attempts, while another survey asks this question of students who acknowledged previous suicidal ideation. Such comparisons will be undertaken in more detail in the future.

CONCLUSION

This is the first report from the Add Health study, the first nationally representative data set including longitudinal data on the health status, risk behaviors, and social contexts of adolescents. These analyses are limited insofar as they do not incorporate the longitudinal in-home or parent data sets.

There is a generation of research yet to be done using the Add Health data set. These analyses should add to our understanding of adolescent health, risk behaviors, resilience, and protective factors—especially adolescent development over time. This study, although cross-sectional, should assist health and social service providers, educators, and others in taking the first steps of establishing priorities and committing to practices and programs that enhance protective factors as well as reduce risk.

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