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Significant Multiple Risk Behaviors Among U.S. High School Students

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Adolescence is a critical period of development during which a range of health risk behaviors may begin that can negatively affect health status and both social and academic functioning. In many cases these behaviors will continue into adulthood. Over the last few decades a large number of studies have examined adolescent health risk behaviors. Much of this literature analyzed prevalence, trends, and demographic patterns of specific health risk behaviors among the adolescent population. Studies have also examined the progression of particular risk-taking behaviors from those that are less serious to those that may be more serious and the implications of the early initiation of specific risk behaviors on future risk behaviors.

With respect to multiple health risk behaviors, building on the work of Jessor and his colleagues,[1,2] there is also a large body of literature analyzing the clustering or interrelatedness of health risk behaviors in adolescents. Most of this research, however, has focused either on determining whether a few specific risk behaviors are likely to co-occur or on identifying the co-occurring health risk behaviors, social factors, and demographic characteristics associated with one particular risk behavior. Only a handful of nationally representative studies have examined the prevalence or interrelatedness of the broad range of health risk behaviors in which adolescents engage, and all but one of these studies is based on data at least 15 years old.

Much of what has been written about the interrelatedness of health risk behaviors among adolescents has been concerned with substance use. This research has consistently found that alcohol and tobacco use co-occur in adolescents,[3,4,5,6] that use of these substances often co-occurs with marijuana use,[7,8] and that adolescents using other illicit drugs are often doing so in addition to using marijuana, tobacco, and alcohol.[9,10] Studies have also found that the use of alcohol, tobacco, and marijuana together is associated with sexual intercourse before age 13, with the number of sexual partners, and with condom nonuse.[11,12,13,14] Other studies have found that binge drinking alone is associated with aggressive behaviors, with suicidal tendencies, and with depressive symptoms.[15,16,17,18,19,20]

Two national studies that are now fairly dated examined the prevalence of multiple health risk behaviors in the adolescent population using a broad set of health risk behaviors.[21,22] They included nine or 10 health risk behaviors that attempted to capture substance use, aggressive behaviors, sexual risk, and suicidal tendencies. Both studies found that about a

third of high school students engaged in two or more health risk behaviors. They found, too, that the prevalence of multiple health risk behaviors increased dramatically from middle school through older adolescence, among males, and among out-of-school adolescents.

Two other national studies taking a broad look at multiple risk-taking behavior among high school students used a cluster analysis technique that was able to identify risk behavior patterns reflecting different lifestyle profiles with different levels of severity or seriousness. The older of the two studies addressed gender differences and found 4 distinct profiles for females and four for males. Although the highest risk profiles tended to be more serious for males, for both sexes the highest risk profiles indicated a correlation among significant substance use, sexual activity, violence, and suicide.[23] The more recent study grouped all students together and identified 10 risk profiles, finding that overall about 40% of students were included in seven clusters involving moderate to high levels of multiple risk-taking behaviors and that the composition of these clusters showed significant differences by race and ethnicity.[24] Both studies substantiated the earlier findings that there are multiple risk behavior syndromes.

This fact sheet provides new national information on multiple health risk behaviors among high school students, based on an analysis of 12 types of significant health risk behaviors that include unsafe sexual behaviors, unhealthy eating and exercise patterns, mental health and substance use problems, and behaviors that contribute to violence. It reports on the prevalence of risk-taking behaviors in the high school population and also the likelihood of students who engage in one risk behavior to be engaging in others. Differences by gender, race/ethnicity, and grade level are examined. In addition, implications for prevention interventions are considered in light of the findings.

Methodology

The 2007 Youth Risk Behavior Survey (YRBS) was used for this analysis. YRBS is a nationally representative survey of all public and private school students in the 50 states and the District of Columbia. Students in grades 9-12 are asked to complete a self-administered questionnaire containing 87 questions covering a variety of health risk behaviors.[25] In 2007, a total of 14,041 questionnaires were completed from 157 schools, for an overall response rate of 68%.[26]

We used two criteria in selecting the risk behaviors for this analysis. One was that the risk represented a reported behavior, action, or feeling on the part of the adolescent. We, therefore, excluded measurable medical risks, such as obesity, and risks reflecting victimization, such as sexual assault. The other criterion was that the risk be serious enough to constitute the potential for a significant health problem. We chose, for example, to use sexual initiation at age 13 rather than ever having had sex and to use binge drinking at least once in the past month rather than having had at least one drink in the past month. In addition, to avoid counting as multiple risk behaviors those behaviors that are likely to be commonly co-occurring and to reflect the same health risk, we elected to group certain risk behaviors together. We created a combined measure for binge drinking and driving while drinking alcohol, which we labeled “problem alcohol behavior.” We also created a combined measure for seriously considering attempting suicide and making a plan to attempt suicide, which we labeled “suicidal thoughts or plans.” And, we created a combined measure for going without eating for 24 hours or more; taking pills, powders, or liquids without a doctor’s advice; and vomiting or taking laxatives to lose weight or to keep from gaining weight, which we labeled “abnormal weight loss behavior.” In this way, we identified 12 significant health risk behaviors, or risk categories, for the study.[27]

Bivariate analyses were conducted using Stata 9.1. Sample weights, strata, and PSUs were incorporated in the analysis, and multiple imputations were performed to account for missing data points.[28] All differences reported as significant are significant at the .01 level or higher. It is important to note that high drop-out rates in many communities limit the generalizability of these results to all high-school age adolescents. More detailed information about the methodology is available from the authors.

Prevalence of Individual Risk Behaviors

Among high school students nationwide, the prevalence of certain risk behaviors is particularly high. Almost 30% of students, as shown in Table 1, felt so sad or hopeless almost every day for two or more weeks in a row during the past 12 months that they stopped doing some usual activities. The same proportion engaged in problem alcohol behavior. In addition, about 20% of high school students had been in a physical fight two or more times during the past year, used marijuana at least once in the past month, and used other drugs such as cocaine, crack, freebase, heroin, methamphetamines, ecstasy, steroids, or sniffed glue or aerosol at least once in their lifetime.

Significant differences were found in the prevalence of each risk factor by gender, race and ethnicity, and grade level. With respect to gender differences, except for lifetime use of drugs other than marijuana, males and females showed different patterns of risk behaviors. Male students had significantly higher prevalence rates than females for seven of the 12 indicators studied -- engaging in problem alcohol behavior, carrying a weapon, physical fighting, using marijuana, seriously considering or planning suicide, having intercourse before age 13, and smoking frequently. Female students, by contrast, were more likely than males to experience persistent sadness, engage in abnormal weight loss behavior, forego all exercise in the past week, and have unprotected sex.

TABLE 1: Prevalence of Selected Risk Behaviors Among High School Students

Risk Behaviors	Total	Gender		Race/Ethnicity			Grade	
		Male	Female	White	Black	Hispanic	Grade 9	Grade 12
Intercourse before age 13	7.5%	10.4%*	4.6%	4.9%	16.2%*	8.5%*	9.6%*	5.1%
Last intercourse unprotected	17.5	15.5	19.4*	16.8	19.7*	19.2*	10.9	27.1*
Persistent sadness	28.7	21.6	35.9*	26.3	29.6*	36.5*	28.5	29.6
Suicidal thoughts or plans	17.6	21.6*	13.6	16.9	16.1	19.5*	18.0*	16.5
Abnormal weight loss behavior	16.0	10.9	21.3*	15.4*	14.1*	19.0*	14.7	16.6*
No exercise in the past week	16.6	12.9	20.3*	15.5	20.8*	16.0	13.5	20.9*
Current frequent smoker	8.2	8.9*	7.5	10.3*	4.4*	4.8*	4.7	12.1*
Problem alcohol behavior	28.7	31.2*	26.1	31.7*	16.8*	30.2*	19.9	39.6*
Used marijuana in the past month	20.1	22.9*	17.3	20.1	21.9*	19.2	15.3	25.3*
Ever used other drug	20.3	20.4	20.1	21.4*	12.2*	23.5*	19.4	19.8
Two or more fights in the past year	21.8	28.5*	14.9	17.8	30.2*	26.6*	25.8*	17.0
Carried a weapon in the past month	18.5	28.8*	7.9	18.4	18.2	19.2	20.6*	15.9

[r] Statistically significant difference at p<.01 level. For race/ethnicity, Blacks and Hispanics are each compared to Whites.

With respect to racial and ethnic disparities, Hispanic students had significantly higher prevalence rates than White students for seven of the 12 risk behaviors, with rates of problem alcohol behavior among Hispanic adolescents at 30% and rates of persistent sadness as high as 37%. Black students had significantly higher rates than White students for six of the selected risk behaviors, with 30% reporting persistent sadness and also fighting. White students had higher prevalence rates than Hispanic students for just one of the selected risk factors -- frequent smoking. Compared to Black students, however, White students had higher prevalence rates for four of the risk factors -- abnormal weight loss behavior, frequent smoking, problem alcohol behavior, and lifetime use of drugs. Among White students, problem alcohol behavior prevalence rates were 32%.

With respect to differences by grade level, prevalence rates for six of the 12 risk behaviors significantly increased between 9th and 12th grades, with the greatest change occurring in the prevalence of unprotected sex and frequent smoking. Perhaps surprisingly, prevalence rates for four of the 12 risk behaviors -- fighting, weapon carrying, intercourse before age 13, and suicidal thoughts or plans -- were higher for 9th graders. These grade level differences may be influenced to a great extent by drop-out rates among older students with these particular risk behaviors.

Prevalence of Multiple Risk Behaviors in the High School Population

A substantially large proportion of adolescents were involved in multiple risk behaviors. Just over half of all high school students nationwide reported they were involved in two or more significant risk behaviors; while as many as 15% reported they were involved in five or more, as shown in Table 2. Male students were significantly more likely than female students to engage in two or more risk behaviors, four or more, and also five or more. Significant racial/ethnic and grade level differences were also evident. Both Black and Hispanic high school students were more likely than White students to engage in two or more risk behaviors. This difference disappeared, however, at the level of five or more risk behaviors; in fact, Black students were significantly less likely than their White and Hispanic student counterparts to be engaged in five or more risk behaviors. A consistent pattern of significant increase in the prevalence of multiple risk behaviors occurred from freshman to senior year in high school.

TABLE 2: Prevalence of Multiple Risk Behaviors Among High School Students

Number of Risk Behaviors	Total	Gender		Race/Ethnicity			Grade	
		Male	Female	White	Black	Hispanic	Grade 9	Grade 12
2 or more	52.8%	53.7%*	51.8%	51.0%	56.7%*	56.9%*	47.9%	58.9%*
3 or more	35.7	36.0	35.4	34.6	35.3	40.4*	31.7	41.2*
4 or more	23.9	24.6*	23.2	23.4	22.3	26.8*	20.8	27.3*
5 or more	15.1	15.4*	14.7	15.1	13.2*	15.9*	12.5	17.1*

* Statistically significant difference at p<.01 level. For race/ethnicity, Blacks and Hispanics are each compared to Whites.

Prevalence of Multiple Risk Behaviors Among Students Engaging in Particular Risk Behaviors

Perhaps more compelling than the prevalence of multiple risk behaviors in the high school population is the fact that those who report engaging in certain risk behaviors generally had a high likelihood of engaging in others. In fact, adolescents engaging in two low-prevalence risk behaviors -- sex before age 13 and frequent smoking -- were found to be highly likely to be engaging in seven other health risk behaviors, as shown in Table 3. The proportion of high school students who reported having intercourse before the age of 13 was only 8%, but among this vulnerable population, about 40% or more gave positive responses for physical fighting, carrying a weapon, feeling persistently sad, having unprotected sex, engaging in problem alcohol behavior, using marijuana in the past month, and ever having used another drug. Similarly, only 8% of students reported frequent smoking, but among these students 40% or more reported positively for having unprotected sex, feeling persistently sad, physical fighting, and carrying a weapon; and well over 60% reported positively for problem alcohol behavior, using marijuana in the past month, and ever having used another drug.

TABLE 3: Prevalence of Multiple Risk Behaviors Among Students Engaging in At Least One Risk Behavior

Risk Behaviors	Co-Occurring Risk Behaviors											
	Intercourse before age 13	Last intercourse unprotected	Persistent sadness	Suicidal thoughts or plans	Abnormal weight loss behavior	No exercise in the past week	Current frequent smoker	Problem alcohol behavior	Used marijuana in the past month	Ever used other drug	Two or more fights	Carried a weapon
Intercourse before age 13	--	44.3%	39.1%	28.8%	26.9%	14.7%	22.6%	43.6%	41.6%	43.6%	50.2%	43.5%
Last intercourse unprotected	19.0%	--	43.5	27.8	25.8	24.5	20.2	45.9	37.3	37.8	30.7	23.6
Persistent sadness	10.2	26.5	--	41.5	30.4	20.9	12.6	37.0	28.1	34.0	30.3	22.9
Suicidal thoughts or plans	12.3	27.6	67.7	--	35.3	22.6	15.4	41.7	31.9	41.2	33.7	27.6
Abnormal weight loss behavior	12.6	28.2	54.5	38.8	--	18.1	14.9	45.7	32.0	39.8	32.2	24.1
No exercise in the past week	6.6	25.9	36.1	24.0	17.4	--	12.3	26.4	21.2	23.0	18.3	15.6
Current frequent smoker	20.6	43.0	43.9	33.0	29.1	24.7	--	75.1	70.4	63.2	42.3	39.9
Problem alcohol behavior	11.4	28.0	37.0	25.5	25.5	15.2	21.5	--	48.6	40.6	34.6	29.5
Used marijuana in the past month	15.5	32.5	40.1	27.9	25.5	17.5	28.8	69.3	--	48.0	40.9	33.5
Ever used other drug	16.1	32.6	48.1	35.8	31.4	18.8	25.6	57.4	47.5	--	41.1	33.6
Two or more fights in the past year	17.3	24.7	39.9	27.2	23.6	13.9	15.9	45.7	37.8	38.2	--	42.3
Carried a weapon in the past month	17.7	22.3	35.6	26.3	20.9	14.0	17.7	45.9	36.5	36.9	49.9	--

It is clear also from the survey that high school students who report using at least one type of substance are highly likely to be using others. Among students who reported problem alcohol behavior, about 40% had used other drugs in their lifetime and about 50% had used marijuana in the past month. Among those who reported ever using a drug other than marijuana, more than 55% engaged in problem alcohol behaviors, and more than 45% had used marijuana in the past month. And, among those who reported using marijuana in the past month, about 70% were involved in problem alcohol behaviors, and almost 50% had ever used other drugs in their lifetime. Importantly also, students reporting that they used marijuana in the past month or had ever used another drug had a high likelihood -- more than 40% -- of experiencing persistent sadness and being involved in two or more fights; this was only slightly less true for those engaged in problem alcohol behavior.

Perhaps not surprisingly, we also found that high school students engaging in abnormal weight loss behavior were highly likely to report risk behaviors associated with mental health and substance use problems. In fact, 55% were persistently sad, and about 40% seriously considered or planned suicide, while about 45% were engaging in problem alcohol behavior, and about 40% were using drugs other than marijuana.

Not surprisingly, too, we found that a very high proportion of students who had considered or planned suicide – more than two-thirds -- also felt persistently sad, but we also found that also more than 40% of these students reported they engaged in problem alcohol behavior and had ever used a drug other than marijuana. Similarly, more than 40% of students who had been in two or more fights said they carried a weapon, but 40% also reported experiencing persistent sad-ness, and about 45% reported problem alcohol behavior.

The only health risk behavior that did not carry a high likelihood -- at least 40% -- of other risks was lack of exercise in the past week, although 36% of students not exercising did report persistent sadness. Interestingly, although persistent sadness and problem alcohol behavior were often reported by students engaging in other risk behaviors, among students who reported persistent sadness or problem alcohol be-havior co-occurring risk behaviors were actually less common.

Overall, high school students who engaged in a single health risk behavior had a surprisingly high likelihood of engaging in other health risk behaviors. More than half of adolescents who reported any of four health risk indictors -- intercourse before age 13, current frequent smoking, using marijuana in the past month, and using other drugs -- were found to report five or more health risk behaviors overall.

Conclusions

Our study found over half of US high school students were engaged in two or more significant risk behaviors, and 15% were involved in at least five. Adolescents at highest risk of multiple risk-taking, consistent with previous research, are males and older students. Racial and ethnic patterns are more complicated, with Hispanic students particularly vulnerable to multiple risk-taking. For each of the 12 risk behaviors studied, different patterns of co-occurring behaviors were found. With the exception of “no exercise,” the other 11 risk behaviors were associated with high rates of co-occurring risk, especially persistent sadness, problem alcohol behavior, and drug use other than marijuana. Documenting an increase in the prevalence of multiple risk behaviors is not possible, however, because the number and severity of selected risk behaviors has not been consistent across studies.

The results of this study, though, confirm that adolescent risk behaviors do not occur in isolation and suggest that interventions, both at the clinical and the community levels, should be designed to identify and reduce the multiple health risk behaviors in which an adolescent may be engaged. Interventions should begin early in adolescence, well before the 9th grade, and should be customized by gender and, to some extent, by race and ethnicity, to be effective. Currently -- whether because of the availability of risk-specific screening tools, categorical funding priorities, or even the Healthy People 2010 framework that targets particular behavior objectives -- most prevention strategies are directed at single health risks.

Primary care providers need to consider the interrelatedness of health risk behaviors among their adolescent patients and conduct comprehensive risk assessments that will help them to identify the frequency and severity of various behavioral risks and also to uncover individual strengths and protective factors, which research has shown can be supported to reduce risk-taking behaviors. Being able to distinguish among normal experimentation, moderate risk, and high risk and to identify those with underlying physical or mental health conditions is critical. With appropriate staff, providers should be able to customize preventive interventions that could include behavioral health counseling that extends beyond the annual preventive visit to provide ongoing communications and support, as well as referrals for treatment.[29] They also may be able to counsel parents whose adolescents are engaged in multiple risk behaviors, particularly parents of younger adolescents, regarding improved communication, monitoring, and other parenting skills that a growing body of literature has suggested can play an important in behavioral risk reduction.[30]

Community level health promotion and disease prevention strategies targeted at this population should also be designed to address the interrelated and dynamic nature of adolescent risk behaviors. In addition to health education curricula, the literature suggests that multiple risk behaviors can be reduced through programs that build self esteem and develop skills for solving problems, resisting peer pressure, and setting life goals.[31-33] Schools and other places where adolescents spend time need to create a community of adult support for young people, providing them a safe and respectful environment and helping them to recognize their individual strengths and to realize their potential. At same time, government agencies need to examine opportunities for implementing laws and program policies that help to improve the health of our nation's adolescents.

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Endnotes

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[27] The 12 significant health risk behaviors are:
- *Intercourse before age 13:* had sexual intercourse for the first time before age 13
- *Last intercourse unprotected*: during the last sexual intercourse, did not use condom
- *Persistent sadness:* during the past year, felt so sad or hopeless almost every day for 2 weeks or more in a row that some usual activities were stopped
- *Suicidal thoughts or plans:* during the past year, seriously considered attempting suicide or made a plan to attempt suicide

- *Abnormal weight loss behavior:* during the past 30 days, went without eating for 24 hours or more to lose weight or keep from gaining weight; took diet pills, powders, or liquids without a doctor's advice to lose weight or keep from gaining weight; or vomited or took laxatives to lose weight or keep from gaining weight
- *No exercise in the past week:* during the past 7 days, did not exercise or participate in physical activity for at least 20 minutes that caused sweating and breathing hard, such as basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities
- *Current frequent smoker:* during the past 30 days, smoked cigarettes on 20 or more days
- *Problem alcohol behavior:* during the past 30 days, had 5 or more drinks of alcohol in a row within a couple of hours at least once or drove a car or other vehicle when drinking alcohol at least once
- *Used marijuana:* during the past 30 days, used marijuana at least once
- *Ever used other drug:* ever used any form of cocaine, including powder, crack, or freebase; sniffed glue, breathed the contents of aerosol spray cans, or inhaled any paints or sprays to get high; used heroin, methamphetamines, ecstasy, or steroid pills or shots, or hallucinogenic drugs, such as LSD, acid, PCP, angel dust, mescaline, or mushrooms
- *Two or more fights:* during the past 12 months, were in a physical fight at least twice
- *Carried a weapon:* during the past 30 days, carried a weapon such as a gun, knife, or club at least once

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The National Alliance to Advance Adolescent Health provides education, research, policy analysis, and technical assistance to achieve fundamental improvements in the way that adolescent health care is structured and delivered in the United States. Its mission is to enhance the physical and emotional well-being of adolescents, especially those who are low-income and minority, by improving the health care delivery model for adolescents and achieving the infrastructure changes needed to support it. The National Alliance seeks to promote comprehensive, interdisciplinary models of physical, mental, behavioral, and reproductive health care that incorporate a youth development philosophy and operate in collaboration with schools and other community-based programs. It also seeks to ensure that all adolescents have health insurance coverage for the services they require.

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