ARTICLE

Demographic, Intrinsic, and Extrinsic Factors Associated With Weapon Carrying at School

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Background: Recent incidents of school violence have heightened the need to identify societal, interpersonal, and adolescent characteristics that contribute to weapon carrying.

Objectives: To assess the prevalence of weapon carrying at school and to determine associated risk factors for adolescent males and females.

Design: A cross-sectional study using the 1994-1995 National Longitudinal Study of Adolescent Health data.

Participants: A nationally representative sample of 6504 adolescents and their parents.

Main Outcome Measure: Whether adolescents have ever carried a weapon at school.

Statistics: χ^2 Analyses and hierarchical regressions were done using SPSS (SPSS Inc, Chicago, Ill) and SUDAAN (Research Triangle Park, NC) software. Regression models included demographic, intrinsic, and extrinsic factors.

Results: Of the overall sample, 9.3% (n=595) reported having carried a weapon at school. Of these, 77% were male (male vs female adjusted odds ratio [AOR], 3.1; 95% confidence interval [CI], 2.3-4.1). Substance use, school problems, perpetration of violence, and witnessing violence were significantly associated with weapon carrying for both males and females. However, for males, extrinsic factors were more important in mediating the effects of substance use and perpetration of physical violence on school weapon carrying, while intrinsic factors mediate these variables for females.

Conclusion: These findings suggest that interventions for violence prevention for males and females need to be targeted toward different areas.

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According to the 1995 Youth Risk Behavior Survey, 10% of high school students reported carrying a weapon to school in the previous 30 days.[1] Although the rates of reported fighting and weapon carrying are decreasing, the prevalence of exposure to violence at school is high.[2] Since 1997, there have been 15 highly publicized school shootings, the majority of which have been in high schools and were committed by students who carried guns to school.

Weapon carrying can result in violence.[3,4] Weapon carrying has most typically been defined in surveys as carrying a gun, knife, or club.[2,5-7] Violence, in turn, has been defined as a threatened or actual use of physical force against a person or group that either results in or is likely to result in injury or death.[8] Students who carry a weapon at school may choose not to use it, but weapon carrying increases the potential for physical injury or death. For this reason, recent school shootings have heightened the need to identify demographic, intrinsic, and extrinsic risk factors associated with weapon carrying at school. Although protective factors are important to consider, risk factors are important to assess for early identification of those adolescents who are likely to carry a weapon at school. The biopsychosocial model proposed by Irwin et al[9] is used to explain many problem behaviors in adolescents. Intrinsic and extrinsic factors, such as those listed previously, are hypothesized to predict risk behaviors such as weapon carrying, through their effect on cognition, self-perceptions, perceptions of the social environment, and personal values. By examining both sets of factors, we can assess adolescents' weapon carrying from a more contextual view. Extrinsic factors can reduce the effects of intrinsic risk factors and vice versa. Extrinsic and intrinsic factors can also interact

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so that their protection or risk can be cumulative. For example, we hypothesize that an impulsive adolescent who has good interpersonal relationships would be protected from high-risk behaviors. Similarly, we hypothesize that an aggressive adolescent who has easy access to weapons and who is exposed to routine community violence would be at high risk for carrying a weapon at school.

Previous literature regarding school weapon carrying has focused on the associations between adolescent risk behaviors and violence.[5,6,10-14] However, these studies do not examine the combined effects of demographic, intrinsic, and extrinsic factors on weapon-carrying behaviors. For the purposes of this study, we defined *intrinsic factors* as internal qualities that affect decision making, and *extrinsic factors* as experiences that adolescents have with the people at home, in their schools, and in their communities.

Our category of intrinsic factors included impulsivity, mental health, and sense of the future. Adolescents who are depressed or who do not have a sense of the future are more likely to engage in risk behaviors like weapon carrying.[15] We include substance use and perpetration of physical violence as intrinsic factors because of their strong correlation to weapon carrying as seen in previously published literature.[7,10,14,16-18] Our category of extrinsic factors included connectedness, exposures to violence in one's community, and safety and victimization. These factors have all been found to have significant correlations with weapon carrying or high-risk behaviors in general.[13,19-23,15,12,16]

This cross-sectional study is one of the first[5,6,11] to examine these diverse variables and their association with weapon carrying at school using a large, nationally representative database. The National Longitudinal Study for Adolescent Health (Add Health) includes items that address extrinsic and intrinsic factors. The objectives of this study were to assess the prevalence of weapon carrying at school, and to determine those risk factors associated with carrying a weapon at school for adolescent males and females.

METHODS

SAMPLE

Add Health assesses the health of adolescents and explores the causes of their health-related behaviors. It is a school-based, nationally representative survey of 7th to 12th graders aged 11 to 21 years in the United States. A sample of 80 high schools was selected and stratified by region of the country, urbanicity, school type, ethnic mix, and size. Schools that sent their 7th- and 8th-grade graduates on to that high school (feeder schools) were identified and recruited. Some high schools spanned 7th to 12th grade and therefore, served as their own feeder school. A total of 134 schools were recruited. More than 90 000 adolescents were surveyed in targeted schools, and a sample of 12 105 adolescents and their parents were then surveyed at home.

There were 3 survey instruments, 1 in-school and 2 in-home, that gathered information from the adolescents and their parents. There were several other instruments regarding contextual variables, school information, and interviewer assessments. Additional detail regarding the Add Health sampling design is available at http://www.cpc.unc.edu/projects/addhealth/. Variables from the adolescent in-home, parent in-home, and the neighborhood or community context instruments were used for the adolescent, socioeconomic, and contextual data in this study.

STUDY POPULATION

The Wave 1 (1994-1995), public-use, in-home database provided cross-sectional data on 6504 adolescents. The mean age of study participants was 15.5 years, and 49% were female. Sixty-seven percent of participants were white, 16% were African American, 12% were Latino, and 5% were "other," including Asians, Native Americans, and Pacific Islanders.

VARIABLES

The dependent outcome variable of interest was "Have you ever carried a weapon at school?" The response categories were yes or no. A preceding question defined a weapon as "a gun, knife, or club." Independent demographic factors included: age, gender, race, ethnicity, parental level of education, urbanicity (defined in the census data as a central place with an adjacent, densely settled surrounding territory, together having a minimum of 50 000 persons), and neighborhood poverty status. Other independent factors included perceived longevity, school suspension, safety in the community, witnessing violence, involvement in domestic, dating or sexual violence, substance use at school, and access to a gun at home.

In addition to the above independent variables, scales were created to address other risk factors. For example, the perpetration scale was composed of questions regarding frequency of physical fighting, gang fighting activity, and threatening someone with a weapon. Six scales were created, containing 3 to 7 items. The scales were (1) interpersonal connectedness, (2) perpetration of physical violence, (3) mental health issues, (4) school connectedness, (5) violent victimization, and (6) impulsivity. Specific variables included in each scale are presented in **Table 1**.

Many of the items included in the scales were 3-point or 5-point Likert responses.[24] All items were assessed for consistency of low score meaning low-risk, and high score meaning high-risk. The responses of those items in each scale were then added to create a score for each adolescent. Adolescents who missed more than 1 question in the scale were not included in the analyses. The frequency distribution for each scale was determined, and low-risk, medium-risk, and high-risk clinical categories were created for each scale based on the tercile distribution of the scores.

STATISTICAL ANALYSES

Data were analyzed using principal component analyses to distinguish individual variables for school and interpersonal connectedness. Cronbach α values used to measure the internal validity of each scale were as follows: interpersonal connectedness, $\alpha = .72$ for 6 items; perpetration of physical violence, $\alpha = .72$ for 7 items; mental health, $\alpha = .70$ for 6 items; school connectedness, $\alpha = .65$ for 7 items; victimization, $\alpha = .65$ for 5 items; and impulsivity, $\alpha = .62$ for 5 items.

Weighted frequencies and Pearson χ^2 testing were done using SPSS 8.0 (SPSS Inc, Chicago, Ill), to determine factors independently associated with weapon carrying at school. Because there were many significant factors, a Spearman correlational matrix was done to assess multicollinearity. Spearman correlation analyses did not demonstrate high enough coefficients to suggest multicollinearity between these vari-

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Table 1. Scale Validity and Composition

Scales	Select Descriptors of Variables
Interpersonal connectedness α = .72 (Missing = 395)	On a 5-point scale (strongly agree, agree, neither, disagree, strongly disagree), most of the time, your mother . . . Is warm and loving Discusses ethics Has good communication with you On a 5-point scale (not at all, very little, somewhat, quite a bit, very much), how much do you feel: Adults care about you Teachers care about you Parents care about your Friends care about you
Perpetration α = .72 (Missing = 50)	On a 4-point scale (never, 1 or 2, 3 or 4, 5 or more times), during the past 12 months, how often did you: Get into a serious fight Hurt someone enough to need care from a doctor Use or threaten to use a weapon to get something On a 3-point scale (never once, more than once), during the past 12 months, how often did each of the following things happen? Got into a physical fight Pulled a knife or gun on someone Shot or stabbed someone During the past 30 days, how many days did you carry a weapon (none, 1, 2 or 3, 4 or 5, 6 or more days)?
Mental health α = .70 (Missing = 24)	On a 4-point scale (never, sometimes, a lot, most of the time), how often was that true during the past week? Hopeful about the future Felt fearful Felt lonely Felt people were unfriendly to you Felt people disliked you Felt life was not worth living
School connectedness α = .65 (Missing = 140)	On a 5-point scale (never, a few times, once a week, almost everyday, everyday), during 1994-95 school year, how often did you have trouble: Getting along with teachers Getting along with other students On a 5-point scale (strongly agree, agree, neither, disagree, strongly disagree), how much do you agree or disagree with the following: You feel close to people at school You feel part of your school Students at school are prejudiced You are happy to be at your school You feel safe in your school
Victimization α = .65 (Missing = 49)	During the past 12 months, how many times were you injured and had to be treated by a doctor or nurse? On a 3-point scale (never, once, more than once), during the past 12 months, how often did each of the following things happen? You were jumped Someone pulled a knife or gun on you Someone shot you Someone cut or stabbed you
Impulsivity α = .62 (Missing = 78)	On a 5-point scale (strongly agree, agree, neither, disagree, strongly disagree), you: Rely on gut feelings Research different solutions to the problem Think there are many approaches to a problem Judge and compare alternatives Analyze what went wrong

ables. Significant factors ($P<.05$) were then included for hierarchical modeling.

Hierarchical regressions using SUDAAN (Research Triangle Park, NC) assessed confounding and effect modification for demographic variables by intrinsic and extrinsic factors. Confounding is the mixing of effects or the distortion of the true relationship between the outcome and independent variable.[25] *Effect modification* is the interaction of variables such that the association between one variable and the outcome is influenced by the other variables.[25] We grouped independent variables into 3 subsets: demographic factors, intrinsic factors, and extrinsic factors. Intrinsic factors included chance of being killed by age 21 years, mental health, impulsivity, perpetration of physical violence, being high or drunk at school, and school suspension. Extrinsic factors included school connectedness, interpersonal connectedness, victimization, partner violence, sexual assault, witnessing violence, neighbors looking out for each other, neighborhood safety, and access to a gun.

Hierarchical models first included demographics; then, combined demographics with intrinsic and extrinsic factors, separately; and finally, combined all 3 subsets of factors. Hierarchical regressions examined the mediating and interactive effects of extrinsic and intrinsic factors before being combined into a composite logistic regression. These analyses were performed for the overall sample, and separately for adolescent males and females. The Hosmer-Lemeshow goodness-of-fit test for the model was $P=.17$ for males and $P=.20$ for females, demonstrating that the models should not be rejected.[26]

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Despite the large sample size, a significance level of $\alpha = .05$ was used for bivariate and multivariate analyses to maintain a broad scope of potential risk factors.[27,28]

RESULTS

PREVALENCE OF WEAPON CARRYING AT SCHOOL

Of the total adolescent sample, 9.3% (n=595) reported ever having carried a weapon at school. Seventy-seven percent of weapon-carrying adolescents were male (adjusted odds ratio [AOR]=3.2; male vs female, $P<.05$). Adolescents who had carried a weapon to school in the last month (n=371) were asked, "During the past 30 days, what one kind of weapon did you carry most often to school?" Sixty-seven percent of these adolescents reported carrying a knife or razor; 13%, a handgun; 8%, some other kind of weapon; 7%, a club; and 5%, a rifle or shotgun. Males were significantly more likely than females to carry a weapon. Eighty-three percent of handgun carriers, 85% of rifle or shotgun carriers, 82% of club carriers, 78% of knife or razor carriers, and 66% of other weapon carriers were male.

Neighborhood poverty and parental education less than or equal to a high school level were significantly associated with weapon carrying at school. Age was significant , with adolescents aged 15 to 17 years being most at risk for weapon carrying. Urban environment was not significant. **Table 2** presents cross-tabulation data on prevalence of weapon carrying by demographic variables.

Table 2. Percentage of Weapon Carrying Adolescents by Demographic Subgroup*

Independent Variable	No. (%) Who Carry a Weapon	Analysis†
Age group, y		
11-14	155 (8.1)	$\chi^2_2 = 7.43$
15-17	357 (10.5)	
18-21	83 (8.6)	
Level of parental education‡		
Less than high school	91 (9.7)	$\chi^2_2 = 9.04$
High school graduate	318 (9.9)	
More than high school	100 (7.0)	
Urbanicity§		
Urban	322 (10.0)	$\chi^2_1 = 2.07$
Nonurban	267 (8.8)	
Neighborhood poverty status, %‖		
<11	300 (8.6)	$\chi^2_2 = 9.95$
11-25	126 (8.9)	
>25	163 (12.2)	
Race/ethnicity¶		
White	318 (8.4)	$\chi^2_3 = 14.87$
Black	160 (11.9)	
Hispanic	88 (12.1)	
Other	29 (8.1)	

*Differences were assessed by Pearson χ^2 testing (34).
†$P<.05$.
‡Level of parental education was assessed by response to the question, "How far did you go in school? (Mark only the highest level.)"
§Urbanicity was defined in the census data as a central place with an adjacent densely settled surrounding territory, together having a minimum of 50 000 persons. Nonurban areas were considered to be a rural farm, rural nonfarm locations, or locations outside of urbanized areas, with a minimum of 1000 persons per square mile.
‖Neighborhood poverty status was based on 1989 federal poverty levels. The percentages shown here relate to the proportion of the neighborhood households with income below this threshold.
¶The "other" racial/ethnic category included Native Americans, Asians, and Pacific Islanders.

INTRINSIC AND EXTRINSIC FACTORS THAT MEDIATE THE EFFECTS OF DEMOGRAPHIC FACTORS

Through hierarchical regressions, we examined effect modification and confounding effects for race and ethnicity, neighborhood poverty, and parental education. Because male gender was the most significant risk factor for weapon carrying at school in the overall sample, we also examined gender differences in separate analyses (**Table 3**).

Initial analyses included only independently significant demographic factors (age, gender, race, ethnicity, parental level of education, urbanicity, and neighborhood poverty status) in the regression model. Male adolescents with a high school–educated parent were 1.6 times as likely to carry a weapon at school than males whose parent had less than or more than a high school education. African American and Latino female adolescents were 2.8 and 2.4 times, respectively, as likely as white females to carry a weapon.

For the second set of hierarchical analyses, high school–level parental education was no longer significant for males when intrinsic and extrinsic factors were separately added into the model. For females, being African American or Latino remained significant despite adding intrinsic and extrinsic factors into the model, although the odds ratios associated with being African American or Latino decreased with each step. African American and Latino females were 2.6 and 2.4 times, respectively, as likely as white females to carry a weapon when intrinsic factors were accounted for, and they were 1.9 and 2.2 times as likely when extrinsic factors were accounted for. These models demonstrated that intrinsic and extrinsic factors act as confounders for parental education for males, and as effect modifiers for race or ethnicity for females.

EFFECT MODIFICATION AND CONFOUNDING FACTORS FOR INTRINSIC AND EXTRINSIC VARIABLES

The second set of hierarchical analyses—adding intrinsic and extrinsic factors separately—demonstrated many factors that were significantly associated with weapon carrying (Table 3). When these factors were combined in the final model, several factors were no longer significant. For example, intrinsic factors such as impulsivity and perceived longevity were no longer significant for males once extrinsic factors were added. Likewise, sexual assault was no longer significant once intrinsic factors were added. This portion of the model demonstrated that intrinsic and extrinsic factors can serve as confounders for each other. There is also effect modification between these 2 sets of factors as seen by the decreased adjusted odds ratios for each variable in the final model.

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Table 3. Hierarchical Regression Analyses for Adolescent Males and Females*

	Males		Females	
	AOR	95% CI	AOR	95% CI
Step 1 – Demographic factors				
Black	. . .	. . .	2.8	(1.6-4.9)
Hispanic	. . .	. . .	2.4	(1.3-4.6)
Parental education (high school)	1.6	(1.1-2.2)	. . .	. . .
Steps 1 and 2 – Demographic and intrinsic factors				
Perpetration	5.2	(3.6-7.6)	3.5	(1.9-6.3)
Drunk at school	2.4	(1.5-3.7)	4.6	(2.4-8.6)
High at school	2.3	(1.6-3.3)	2.9	(1.6-5.2)
School suspension	. . .	. . .	2.9	(1.8-4.7)
Black	. . .	. . .	2.6	(1.6-4.6)
Hispanic	. . .	. . .	2.4	(1.2-4.7)
Impulsivity	1.5	(1.1-2.1)	. . .	. . .
Chance of being killed by age 21 y	1.4	(1.1-1.8)	. . .	. . .
Steps 1 and 3 – Demographic and extrinsic factors				
Partner violence	6.8	(2.4-20.0)	. . .	. . .
Victimization	3.5	(2.4-5.1)	2.8	(1.5-5.1)
Witnessing	2.6	(1.8-3.8)	2.4	(1.4-4.0)
Hispanic	. . .	. . .	2.2	(1.1-4.5)
Sexual assault	. . .	. . .	2.0	(1.1-3.7)
Black	. . .	. . .	1.9	(1.0-3.6)
Easy access to a gun	1.5	(1.1-2.0)	. . .	. . .
Interpersonal connectedness	0.5	(0.3-0.8)	0.5	(0.3-0.8)
School connectedness	0.4	(0.2-0.6)	0.4	(0.2-0.8)

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval.
*For comparison between male and female subjects, $P<.05$. Ellipses indicate not applicable.

Table 4. Final Model of Significant Associations for Weapon Carrying by Gender*

	Males (n = 2406)		Females (n = 2595)	
	AOR	95% CI	AOR	95% CI
Partner violence	4.0	(1.3-12.3)	. . .	. . .
School suspension	. . .	. . .	2.5	(1.5-4.4)
Hispanic	. . .	. . .	2.3	(1.1-4.8)
Black	. . .	. . .	2.2	(1.1-4.3)
Perpetration	2.5	(1.4-4.2)	2.2	(1.1-4.3)
Witnessing violence	2.3	(1.6-3.4)	1.9	(1.1-3.4)
Drunk at school	2.0	(1.3-3.3)	5.4	(2.8-10.6)
Victimization	2.0	(1.3-3.0)	. . .	. . .
High at school	1.7	(1.1-2.6)	2.3	(1.2-4.3)
Access to a gun	1.5	(1.1-2.0)	. . .	. . .
Interpersonal connectedness	0.5	(0.3-0.8)	. . .	. . .
School connectedness	0.4	(0.3-0.7)	. . .	. . .

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval.
*For comparison between male and female subjects, $P<.05$. Ellipses indicate not applicable.

FACTORS ASSOCIATED WITH WEAPON CARRYING AT SCHOOL

All significant independent variables were included in the final hierarchical regression model. The findings for the male and female subgroups are compared in **Table 4**. Of note, commonly used socioeconomic markers such as parental education less than college, urban environment, and neighborhood poverty were not significantly associated with weapon carrying at school in the final regression analyses. Partner violence (AOR=4.0), perpetration of physical violence (AOR=2.5), witnessing violence (AOR=2.3), interpersonal connectedness (AOR=0.5), and school connectedness (AOR=0.4) were the most significant factors for males. Being under the influence of substances at school (AOR=5.4 for alcohol; AOR=2.3 for drugs), school suspension (AOR=2.5), being African American (AOR=2.2) or Latino (AOR=2.3), and perpetration of physical violence (AOR=2.2) were most significant for females.

AFRICAN AMERICAN AND LATINO FEMALES WHO CARRY WEAPONS

The role of race or ethnicity was a significant factor for weapon carrying only for females in our study. Logistic

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Table 5. Significant Associations for Weapon-Carrying Females by Race/Ethnicity*

	White (n = 1577)		Black (n = 602)		Hispanic (n = 288)	
	AOR	95% CI	AOR	95% CI	AOR	95% CI
School suspension	. . .	. . .	9.7	(3.5-26.6)	5.2	(1.7-16.3)
Perpetration	. . .	. . .	5.5	(1.2-24.4)	. . .	. . .
High at school	4.9	(1.7-14.6)	. . .	. . .	. . .	. . .
Drunk at school	4.2	(1.5-11.6)	23.6	(3.9-142.6)	15.0	(3.0-75.0)
Victimization	4.2	(1.1-16.1)	. . .	. . .	. . .	. . .
Neighborhood safety	. . .	. . .	0.4	(0.2-0.9)	. . .	. . .
Interpersonal connectedness	. . .	. . .	0.3	(0.1-0.8)	. . .	. . .

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval.
*For comparison between male and female subjects, $P<.05$. Ellipses indicate not applicable.

regressions were performed to compare white, African American, and Latino females. The results for the female subgroups are presented in **Table 5**. Females who were classified as "other" race were not included in these analyses because of the small sample size (n=128). As presented in Table 5, there were differences between the groups. Being drunk at school was a more significant risk factor for African American (AOR=23.6) and Latino females (AOR=15.0) than for white females (AOR=4.2). Other independent variables such as victimization, interpersonal connectedness, and neighborhood safety became significant for white and African American females in these analyses when they were not significant in the analyses of all females in the previous hierarchical regressions.

COMMENT

This study examined the effects of demographic, intrinsic, and extrinsic factors on school weapon carrying by using a large, nationally representative database, Add Health. The results of the hierarchical regressions expand our understanding of the interaction of demographic, intrinsic, and extrinsic factors relative with school weapon carrying. For example, the hierarchical regressions demonstrate that the effects of parental education and neighborhood poverty were mediated by intrinsic and extrinsic factors. The fact that environment was not significant in our bivariate analyses speaks to the importance of other factors such as the ones we propose here, to explain the problem of school weapon carrying.

Significant factors in the final model were consistent with the previous literature. This study demonstrated that male gender was one of the most significant risk factors associated with weapon carrying at school.[3,16] These findings countered those of Simon et al,[5] who found females to be more likely to carry a weapon than males. African American and Latino females in our sample were at risk for weapon carrying. It is unclear why race or ethnicity was significant for females, but not for males. Race or ethnicity and poverty are difficult to separate because many African American and Latino families in the United States live in concentrated poverty.[29] Decreased neighborhood cohesion secondary to concentrated poverty may put African American and Latino females at risk for victimization.[30] Indeed, in the specific ethnicity/gender analyses, other factors such as neighborhood safety became important for African American females. For protection, these females may choose to carry a weapon to insure safety in their neighborhood, and by extension, at school. As demonstrated by the other factors that proved significant in the analyses of factors among females (eg, being drunk at school), these African American and Latino females who carried weapons were particularly high-risk subgroups.

Those males with a history of partner violence were at a greater risk factor for school weapon carrying than those males who did not. Theoretical models often link aggression and violent behavior and can be used here to explain the association of partner violence to school weapon carrying. However, the survey item did not distinguish between being a perpetrator or a victim with respect to partner violence. Partner violence, in comparison to perpetration of physical violence, seems to indicate a more severe form of interpersonal violence that strongly correlates with weapon carrying.

An association exists between substance use and weapon carrying.[6,16] The use of substances at school might indicate that this was a subgroup of males and females who were not feeling connected or engaged in school. Their substance use at school may also have consequences for decision-making, as adolescents under the influence are less likely to consider the consequences of weapon carrying.

School connectedness and interpersonal connectedness were significantly protective against school weapon carrying for all males and for African American females. Consistent with the resiliency model,[17] the more assets adolescents have, the more likely that they will make positive choices. Good relationships with parents, teachers, other adults, and peers are important assets that contribute positively to an adolescent's behavior. Adolescent females, on the other hand, were 2.5 times more likely to carry a weapon at school if they had been suspended. School suspension may suggest behavioral issues and academic failure rather than lack of connectedness. School suspension again emphasizes that these weapon-carrying females were a high-risk subgroup.

Perpetration of physical violence and witnessing violence was significant in both gender analyses. Victimization, on the other hand, was significant for males and white females. Adolescents who have been victimized may feel

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What This Study Adds

Recent school shootings have heightened the need to identify demographic, intrinsic, and extrinsic factors associated with weapon carrying at school. Previous literature regarding school weapon carrying has focused on individual correlates of violent behavior. This study examined the combined effects of demographic, intrinsic, and extrinsic factors by using a large, nationally representative database, the National Longitudinal Study for Adolescent Health. Substance use, perpetration of physical violence, and witnessing violence were significant correlates overall. However, for males, extrinsic factors were found to be more important in mediating the effects of substance use and perpetration on school weapon carrying, while intrinsic factors mediate these variables for females. These findings suggest that interventions for violence prevention for males and females need to be targeted toward different areas.

vulnerable and choose to protect themselves with a weapon. Interestingly, victimization was significant only for white females. Adolescent females are more at risk for sexual assault than males,[31] yet victimization does not seem to be a motivator to carry a weapon at school for some females.

Surprisingly, access to a gun at home was minimally significant for males. In this same adolescent sample, it was found that the majority of weapon-carrying adolescents carried a knife or razor at school, which would explain why easy access to a gun was not more significant in our analyses. However, the fact that access to firearms has increased the lethality of violence[32] makes it a particularly important issue to retain in discussions regarding potential school violence.

These findings suggest that interventions for violence prevention for males and females need to be targeted toward different areas. Males may benefit from extrinsic supports such as interpersonal and school connectedness, and lack of access to a gun, despite being impulsive or having decreased perceived longevity. Females may benefit from interventions that improve problem-solving skills.

LIMITATIONS

There are, however, limitations. Our analysis uses one wave of data, and therefore, could not assess causality. Only longitudinal data will allow us to understand if antecedent factors like school and interpersonal connectedness predict protection against future school weapon carrying. Longitudinal studies are also needed to assess adolescents' sense of security in light of recent national school shootings and their subsequent decisions to carry a weapon or not. Add Health is a school-based survey. We do not have access to the those adolescents who have been expelled or who have dropped out of school, as school failure is highly correlated with violence and other high-risk behaviors.[33] This study relied on adolescent self-report as the "gold standard," with no means to corroborate weapon carrying at school. This item about weapon carrying posed a threat to validity because it is a sensitive question regarding illegal behavior. Thus, we may be underestimating the prevalence of school weapon carrying. Also, Add Health did not include specific items about chronic (and potentially more desensitizing) domestic or community violence exposure. There were also no items regarding other contexts for weapon carrying, adolescent attitudes about weapon carrying, or the violent content of television and video games to which the adolescents were exposed.

IMPLICATIONS

Violence prevention programming must be community based to encompass adolescents who carry weapons at and outside of school. For school weapon carrying specifically, intrinsic and extrinsic factors such as substance use, coping skills, school behavioral problems, and connectedness must be addressed. Additionally, violence interventions need to be tailored to gender, racial, and ethnic differences in risk.

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