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Characteristics of Youth with Combined Histories of Violent Behavior, Suicidal Ideation or Behavior, and Gun-Carrying

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Abstract

Background—Youth reporting combined histories of nonfatal violence, suicidal ideation/behavior, and gun-carrying (VSG) are at risk for perpetrating fatal interpersonal violence and self-harm.

Aims—We characterize these youth to inform prevention efforts.

Methods—We analyzed 2004 data from 3,931 7th, 9th, and 11–12th grade youth and compared VSG youth (n=66) to non-gun carrying youth who either had no histories of violence or suicidal thoughts/behavior (n=1,839), histories of violence (n=884), histories of suicidal thoughts/behaviors (n=552), or both (n=590). We compared groups based on demographic factors, risk factors (i.e., friends who engage in delinquency, peer-violence victimization, depressive symptoms, illicit substance use), and protective factors (i.e., school connectedness, parental care and supervision). Regression models identified factors associated with VSG youth.

Results—Illicit substance use and having friends who engage in delinquency were more common among VSG youth in all comparisons; almost all VSG youth had high-levels of these factors. Depressive symptoms were positively associated with VSG youth versus youth without either violent or suicide-related histories and youth with violent histories alone. School connectedness and parental supervision were negatively associated with VSG youth in most comparisons.

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Conclusions—Family-focused and school-based interventions that increase connectedness while reducing delinquency and substance use might prevent these violent tendencies.

Keywords

Youth violence; youth suicide; youth gun-carrying

INTRODUCTION

It is well-known that youth peer and self-directed violence are public health problems (Logan, Crosby, & Hamburger, 2011; Lubell & Vetter, 2006). The Centers for Disease Control and Prevention estimates that over 270,000 youth of ages 10–17 years are seen in emergency departments annually for injuries attributed to either assault or self-harm (CDC).

Furthermore, homicide and suicide have ranked within the top four leading causes of death for this age group in most years between 2000 to 2013 (CDC). Epidemiologic studies reveal that many individual, relationship, and community factors can increase risk of interpersonal and self-directed violence among youth. These factors include: individual mental health and substance abuse problems (Borowsky, Ireland, & Resnick, 2001; Logan et al., 2011; Molcho, Harel, & Dina, 2004); parent, peer, or dating relationship problems (Borowsky et al., 2001; Foster & Brooks-Gunn, 2013; Klomek, Marrocco, Kleinman, Schonfeld, & Gould, 2007; Logan et al., 2011); friends who engage in delinquent behaviors (Haggerty, Skinner, McGlynn-Wright, Catalano, & Crutchfield, 2013; Logan et al., 2011; Vitaro, Pedersen, & Brendgen, 2007); and violence victimization by a peer, date, or parent/guardian (Borowsky et al., 2001; Klomek et al., 2007; Logan et al., 2011; Millett, Kohl, Jonson-Reid, Drake, & Petra, 2013; Peter, Roberts, & Buzdugan, 2008). Factors that have been found to protect against, or buffer risk of, youth interpersonal and/or self-directed violence include parental care and supervision (Logan et al., 2011; Shlafer, McMorris, Sieving, & Gower, 2013), school connectedness (Chapman, Buckley, Reveruzzi, & Sheehan, 2014; Logan et al., 2011), and positive relationships with peers and family members (Cheng et al., 2009; Logan et al., 2011; Shlafer et al., 2013; Swahn, Simon, Arias, & Bossarte, 2008; M.H. Swahn et al., 2008). Pro-social behaviors such as engaging in school activities, focusing on academic achievement, and developing coping skills to better handle stress, sometimes referred to as “promotive” factors for prevention, might also help youth avoid violent conflict (Hahn et al., 2007).

The public health approach to preventing youth interpersonal violence and suicidal behavior aims to reduce risk factors and increase protective and promotive factors (Fagan & Catalano, 2013; Hahn et al., 2007; Substance Abuse and Mental Health Services Administration). Currently, there are youth programs that use this approach and can be implemented in community and school-based settings (David-Ferdon & Simon, 2014). These programs often focus on one of three forms: universal interventions intended for youth regardless of risk; selected interventions for youth at heightened risk (based on risk factors); and indicated interventions for youth already exhibiting aggressive and violent behavior (Multisite Violence Prevention Project, 2009). Research has shown that targeted programs that focus resources on youth at risk or those already exhibiting aggressive violent behavior can have

profound ecological impacts on the broader population of youth (Multisite Violence Prevention Project, 2009).

Selected and indicated youth programs intended to prevent interpersonal violence and self-harm might benefit from research that assesses risk and protective factors associated with youth who have the combined histories of violence aggression, suicidal thoughts and/or behaviors, and gun-carrying. Youth who have one or more of these histories can be at risk of perpetrating multiple violent acts including suicide (Borges, Angst, Nock, Ruscio, & Kessler, 2008; Borowsky et al., 2001) as well as homicide and other interpersonal violent behaviors (Kodjo CM, Auinger P, & SA., 2003; Ruback RB, Shaffer JN, & Clark VA, 2011). Also, numerous descriptive studies on the most egregious violent suicide incidents among youth and young adults that also involve homicide victims find these acts to be commonly perpetrated with a firearm and often by individuals who had either prior interpersonal violent behavior, suicidal thoughts/behaviors, or both (Bossarte, Simon, & Barker, 2006; Logan et al., 2008; Logan, Walsh, Patel, & Hall, 2013; Marzuk, Tardiff, & Hirsch, 1992; Meloy et al., 2004).

The mental, behavioral, relationship, and social characteristics of youth with these combined histories are still unclear. Also, a better understanding of how this high-risk youth group differs from other youth with respect to demographic and known violence-related risk and protective factors might provide valuable information for youth violence and suicide prevention efforts. We explored this area of research.

METHODS

Study Design

We used 2004 data from the “Youth Violence Survey: Linkages among Different Forms of Violence” (‘Linkages’) study. This study surveyed youth from a high-risk community to examine the relationships among various types of interpersonal and self-directed violent behaviors and the common associated risk and protective factors in the realm of exposures to violence, interactions with school environments, and relationships with peers and family members (Swahn et al., 2008).

Study Population and Setting

The population resided in a U.S. school district that was ranked among the highest 25 nationally in poverty, the highest 10 in crime rates, and the highest 35 in unemployment (M.H. Swahn et al., 2008). All public schools within this district, 16 in total, participated in the study. Before data collection, written parental permission and student assent were obtained from all students. To accommodate non-English speaking parents, permission forms were provided in Spanish and other school-requested languages. An Institutional Review Board approved this study before it was conducted. More details about the study are reported by Swahn and colleagues (2008).

The study population included English-speaking students in grades 7, 9, 11, and 12. Figure 1 in the “online material” provides a flow diagram illustrating the inclusion/exclusion criteria of our study population. In summary, there was 5,451 students in these grades. A total of 353

students were not eligible because they either could not complete the survey (e.g. needed a translator, had cognitive disabilities) (n=151) or were no longer attending school (e.g. dropped out, been expelled/suspended) (n=202). Of the 5,098 students who were eligible, 4,131 (81%) answered the survey: 1,491 in 7th grade; 1,117 in 9th grade; and 1,523 in 11th and 12th grades combined. Eleventh and 12th grade students were combined because they had small student populations. Participation rates exceeded 73% in all grades. Students received a $5 gift card for returning the parental permission form and another $5 gift card after completing the survey.

Study Groups

We identified youth who reported histories of interpersonal violent behavior (hereafter referred to as "violent" youth) and suicidal thoughts and behaviors (hereafter considered "suicidal" youth). Violent youth were those who committed at least one of the following acts within 12 months prior to the survey: threatened someone with a knife or gun; threatened to throw something at someone; hit, slapped, slammed, or kicked someone; punched/hit someone with an object; forced a person to have sex; and/or hurt someone enough to where he/she needed medical attention. Youth were also considered to be violent youth if they committed any of the following acts at least five times in their lifetime: hurt someone enough to where the victim needed medical attention; threatened to use a weapon to get something from someone; and/or took part in a gang fight. Youth were considered suicidal if they seriously considered suicide, planned suicide, and/or attempted suicide within 12 months prior to the survey.

We divided youth into four groups: those who were "nonviolent/nonsuicidal" (n=1,874); those who were "violent-only" (n=1,012); those who were "suicidal-only" (n=567); and those who were violent and suicidal (hereafter referred to as "violent/suicidal") (n=678) (Figure 1). We then identified youth in each group who recently carried a gun (i.e., carried a gun at least one day within 30 days prior to the survey). *(Note: nineteen (2.1%) violent-only youth and 22 (3.6%) violent/suicidal youth did not report recent gun-carrying but did report threatening someone with a knife or gun within the year prior to the survey. Because we were unable to determine their appropriate group, we excluded them from our analyses.)*

We identified 66 youth with combined histories of violent, suicidal, and gun-carrying behavior. These youth are referred to as "violent/suicidal/gun-carrying" (VSG) youth. We compared VSG youth to only *nongun-carrying* youth in each of the four groups:

1. Nonviolent/nonsuicidal youth (n=1,839)
2. Violent-only youth (n=884)
3. Suicidal-only youth (n=552)
4. Violent/suicidal youth (n=590)

We intended to compare VSG to the gun-carrying youth in each group as well but small sample sizes among gun-carrying nonviolent/nonsuicidal, violent-only, and suicidal-only youth precluded thorough comparisons (see Figure 1 for details).

Characteristics of Interest

We compared VSG youth to each of the four comparison groups with regard to demographic characteristics (i.e., age, sex, and race/ethnicity), known risk factors for violence (i.e., having friends who engage in delinquent behaviors, peer violence victimization, depressive symptoms, and illicit substance use), and known protective factors against violence (i.e., feeling connected to school, having parental care and supervision). Multiple survey items were used to assess each risk and protective factor. Each survey item used a scale of response options (e.g., one item used to assess school connectedness "*You feel close to people at your school*" has five response options: 1-strongly disagree; 2-disagree; 3-neither agree or disagree; 4-agree; and 5-strongly agree). Details on the specific survey items, the response options, and the Cronbach's alphas for each risk and protective factor are provided in the online material (Box 1).

We first dichotomized each known risk and protective factor based on having any exposure to that factor. This way, we could characterize the magnitude, or prevalence, of each exposure for the entire study population. Details on how we dichotomized the exposures are also provided in the online material (Box 1).

To improve our ability to make between-group comparisons, we divided the entire population into roughly equal thirds for each risk and protective factor based on the *degree of exposure*. For each respondent, we totaled the scale scores responses across all survey items for each given factor and then divided the total scores by the number of answered survey items to create average scale scores for each factor. For example, if there were six survey items for one risk or protective factor assessed and the respondent answered five of the six items, then we calculated his or her average scale score from the five answered items. Details on response patterns are also provided for each variable in the appendix (Box 1). Then, for each factor, we categorized youth as having either "low," "moderate," or "high" scores based on the study population distributions of the average scale scores: those with "low" scores were those with a score that was equal or less to the value marked at the 33%ile; those with "high" scores were those that had a value higher than the one marked at the 66%ile; and those with scores in between were considered to have "moderate" scores.[1] For the variable "illicit substance use," higher scale responses on the corresponding survey items implied less use; therefore, this variable was reverse coded to be consistent with the other variables. Respondents who did not answer any questions for a specific factor were considered to have "unknown" values for that factor and were not categorized.

Statistical Analysis

We first described the population based on the prevalence of youth exposed to each factor. We then described the prevalence of low, moderate, and high scoring youth for each factor across all the study groups. We used bivariate analyses to identify crude differences between

[1]It should be noted that the low, moderate, and high average scale score categories divide respondents by degree of exposure based on the population distribution and should be viewed distinctly from having "any" indication of exposure. For example, while roughly a third of the youth will be categorized as having a low average scale score for depressive symptoms (compared to the remaining two-thirds), some of these youth still had some depressive symptoms.

the VSG youth and each of the comparison groups. Fisher's exact tests were used to conduct these analyses.

Additionally, for each comparison (e.g., VSG youth versus nonviolent/nonsuicidal youth, VSG youth versus violent-only youth, and so forth), we estimated the prevalence of VSG youth (i.e., %VSG) for each level, or subcategory, of each characteristic. We then calculated adjusted prevalence ratios (aPRs) for each characteristic comparing %VSG between one subcategory to another (e.g., high scoring youth to low scoring youth). We treated %VSG as a dependent variable to identify which characteristics were associated with being in the VSG group versus the comparison groups while accounting for all other characteristics (e.g., age, sex, race/ethnicity, and all other risk/protective factors) and avoiding multiple between-group comparisons for each individual variable. We used aPRs as the measures of association because of the cross-sectional study design.

We estimated all aPRs using Poisson regression models with robust variance estimates, a statistical method commonly used to estimate aPRs (Barros AJ & Hirakata VN, 2003; Logan, Leeb, & Barker, 2009; Spiegelman D & Hertzmark E, 2005). For most risk and protective factors, we used the prevalence of VSG youth in the low average score subcategory as the referent prevalence. For two variables, "having delinquent friends" and "illicit substance use," we combined the prevalence of VSG youth in the low and moderate average scale score levels into the referent level because of small cell counts in some of the groups.

All models accounted for cluster-correlation effects within each school. Furthermore, because we used four regression models to make between-group comparisons, we adjusted the level of significance to be 0.01($\alpha = 0.05/4$). Tests for collinearity among variables in each model were conducted using variable inflation factor scores; all scores were less than 2.0 which indicated the variables were not strongly collinear.

RESULTS

Characteristics of Study Population

The study population consisted of youth of preadolescent/adolescent ages with the majority (58.3%) being of age 15 years or younger (Table 1). The population was nearly divided equally by sex with a slightly higher proportion of females (53.4%). Hispanic youth accounted for the greatest proportion (43.7%) of the population. Non-Hispanic blacks (24.3%), non-Hispanic whites (22.9%), and other non-Hispanic minorities (7.8%) made up most of the remaining population.

Over half (54.4%) of the population had at least one incident of peer-violence victimization within the year prior to the survey, 53.9% used illicit substances on at least one day within the year prior to the survey, just over half of the population reported having some friends (more than just a few) who engaged in delinquent behaviors, and over a third of the population reported having depressive symptoms at least sometimes within 30 days prior to the survey (Table 1). We also found that 39.6% of youth reported at least some school

connectedness, 77.1% of youth had some parental monitoring, and 60.2% had some parental caring (i.e., rewarding positive behavior).

VSG versus Nonviolent/Nonsuicidal Youth

Of the 66 VSG youth, 55.8% were 15 years of age or younger, 75.8% were male, and 84.9% were of non-white race/ethnicity (Table 2). Nearly all VSG youth had high scores on illicit substance use (92.4%) and friendships with youth who engaged in delinquent behaviors (90.9%). The majority of the VSG group also had high scores with regard to depressive symptoms (60.6%) and peer-violence victimization (57.6%).

Most VSG youth had low scores on school connectedness (62.1%) and parental supervision (68.2%). A high proportion (48.5%) of VSG youth also scored low on having parental caring.

Compared to the nonviolent/nonsuicidal group, VSG youth were not significantly different with respect to age based on the bivariate analysis; however, VSG youth were less prevalent among older youth 16+ years of age versus youth of ages 12–13 years in the adjusted analysis (aPR: 0.48; 99%CI: 0.25–0.92) (Table 2). The VSG group was more commonly male compared to the nonviolent/nonsuicidal group (75.8% versus 50.1%, $p<0.01$) based on the bivariate analysis and male sex was a predictor for being in the VSG group after adjusting for all other characteristics (adjusted prevalence ratio [aPR]: 2.23; 99% confidence intervals [99%CI]: 1.18–4.23). All surveyed risk factors were positively associated with VSG youth and school connectedness and parental supervision were negatively associated with VSG youth in this comparison after adjusting for all characteristics (all measures of association were significant at the 0.01 level).

VSG versus Violent-only Youth

Compared to the violent-only youth, VSG youth were also not different with respect to age based on the bivariate analysis; however, VSG youth were less prevalent among older youth 16+ years of age versus youth of ages 12–13 years in the adjusted analysis (aPR: 0.36; 99%CI: 0.21–0.60), similar to the comparison with the nonviolent/nonsuicidal youth (Table 3). VSG youth were more commonly male compared to violent-only youth (75.8% versus 52.7%, $p<0.01$) based on the bivariate analysis and male sex remained a predictor of VSG after accounting for all characteristics in this comparison (aPR: 2.68; 99%CI: 1.35–5.32).

VSG youth more commonly than violent-only youth had high scores for friends who engaged in delinquent behaviors (90.9% versus 42.7%, $p<0.01$), depressive symptoms (60.6% versus 24.0%, $p<0.01$), and illicit substance use (92.4% versus 32.8%, $p<0.01$) in the bivariate analysis and these factors remained positively associated with VSG youth after accounting for all characteristics (all p-values<0.01). We also found that VSG youth scored much lower on school connectedness compared to the violent-only youth and school connectedness remained negatively associated with VSG youth in this comparison after accounting for all other characteristics.

VSG versus Suicidal-only Youth

Similar to the previous comparisons, VSG youth were less prevalent among older youth of ages 16+ years versus those of ages 12–13 years in the adjusted analysis (aPR: 0.54; 99%CI: 0.33–0.90), but no age differences were observed in the bivariate analysis (Table 4). VSG youth were more commonly male compared to the suicidal-only youth (75.8% versus 32.1%, $p<0.01$) based on the bivariate analysis and male sex remained a predictor of VSG in this comparison after accounting for all characteristics (aPR: 3.82; 99%CI: 1.95–7.50). Also, VSG youth were more prevalent among Hispanic versus non-Hispanic white youth in the adjusted comparison (aPR: 2.25; 99%CI: 1.37–3.70).

Compared to the suicidal-only youth, VSG youth more commonly had high scores for having friends who engaged in delinquent behaviors (90.9% versus 26.6%, $p<0.01$) and illicit substance use (92.4% versus 28.8%, $p<0.01$) according to the bivariate analyses. These two factors remained positively associated with VSG youth after accounting for all characteristics (both aPRs were significant at $p<0.01$).

VSG versus Violent/Suicidal Youth

Compared to other violent/suicidal youth, VSG youth were more commonly male (75.8% versus 33.6%, $p<0.01$) in the bivariate analysis and male sex remained a strong predictor of VSG (aPR: 5.01; 99%CI: 2.39–10.48) in the adjusted analysis (Table 5). VSG youth more commonly had high scores on illicit substance use (92.4% versus 44.2%, $p<0.01$) and illicit substance use remained positively associated with VSG after accounting for all factors (aPR: 6.89; 99%CI: 2.00–23.73). In addition, we found that VSG youth had much lower scores on school connectedness versus violent/suicidal youth in the bivariate analysis, and school connectedness remained negatively associated with VSG in the adjusted analysis (aPR: 0.48; 99%CI: 0.26–0.86).

DISCUSSION

Our assessed risk factors were highly common among VSG youth and some remained positively associated with VSG youth when compared to other youth with violence and/or suicide related histories. An overwhelming majority of VSG youth had high scores on illicit substance use and friendships with others who engaged in delinquent behavior versus all comparison groups. These are well known risk factors for violence and suicide among youth, particularly among chronic offenders (Borowsky et al., 2001; J. E. Logan, 2009; Mercy J, Butchart A, Farrington D, & Cerdá M, 2002). Among males in this study, VSG only made up 6% of those with violent behaviors and 11% of those with suicidal tendencies. However, among males with high scores on illicit substance use and having friends who engaged in delinquent behavior, the prevalence of VSG was 2–3 times higher (14% of those with violent behavior and 30% of those with suicidal tendencies) (data not shown), which illustrates how the prevalence of VSG behavior among violent and suicidal youth increases with the presence of these two factors. VSG youth also more commonly had depressive symptoms than violent-only youth, which is similar to fatal violent perpetrators. Perpetrators of homicide-followed-by-suicide (“homicide-suicide”) are also more likely to have histories of depression compared to other homicide perpetrators (Byard, Knight, James, & Gilbert,

1999; Rosenbaum, 1990); however, more research is needed to assess whether VSG youth are at risk for homicide-suicide perpetration.

Fewer VSG youth received high levels of parental supervision than youth in many of the comparison groups. Furthermore, being of young early adolescent age was also independently associated with VSG youth in most comparisons after we accounted for the risk factors, which were more often observed in older youth (e.g., illicit substance use). These findings highlight the important role of family, particularly parental supervision and monitoring, and risk for violence. We found that less than 10% of VSG youth had high levels of parental supervision. Early adolescence is a particularly risky developmental period and one of increased risk for youth involvement in aggression (Dodge et al., 2003; Henry, Farrell, Schoeny, Tolan, & Dymnicki, 2011). At the same time, this is a developmental period marked by a decrease in parental monitoring (Hayes, Hudson, & Matthews, 2003; Matjasko et al., 2013) and an increase in parent-adolescent conflict (Shanahan, McHale, Osgood, & Crouter, 2007). These findings together suggest a need for family focused youth violence and suicide prevention programs targeting high risk adolescent youth. Family-based intervention programs, like behavioral parent training and multisystemic therapy, have demonstrated sustained impact on adolescent aggression and violence and have been found to be among the most effective interventions in reducing risk for youth violence (Farrington & Welsh, 2003; Lundahl, Risser, & Lovejoy, 2006; Maughan, Christiansen, Jenson, Olympia, & Clark, 2005; Piquero, Farrington, Welsh, Tremblay, & Jennings, 2008; Thomas & Zimmer-Gembeck, 2007). Although, more research is needed to examine some of these programs with respect to suicide-related outcomes.

Family-based programs can be implemented in high risk communities, which might provide a viable option to reach youth at risk of developing violent tendencies. For example, GREAT Families, a family-focused intervention delivered within multiple family groups, was specifically designed to help high risk families of young adolescents manage child-rearing within the constraints and opportunities provided by their social contexts. The goal of the intervention has been to change parenting practices (e.g., monitoring, quality of discipline practices, and parental involvement in school), family relationship characteristics (e.g., cohesion, organization, support, problem-solving ability), and aspects of parenting and family functioning that have been empirically tied to risk for violence, self-harm, and other problem behaviors. Effects of the intervention were found on several youth outcomes, including aggression and school bonding (Multisite Violence Prevention Project, 2009) as well as parental monitoring, family cohesion, and family problem-solving (Multisite Violence Prevention Project, 2013). Relevant to the findings here, the intervention slowed the declines in parental monitoring and other parenting behaviors that typically occur over the transition to adolescence. Targeting families of high risk youth, particularly during this important developmental period, could be one of the most effective tools to support youth growth and development.

Connecting youth with school is another important target of intervention; VSG youth were less connected to school than many of the other youth comparison groups. The relation of school bonding or school connectedness and risk is well established, with multiple studies reporting that school connectedness is inversely associated with youth violence and suicidal

behavior (Bernat, Oakes, Pettingell, & Resnick, 2012; Chapman, Buckley, Sheehan, Shochet, & Romaniuk, 2011; Logan et al., 2011). The findings here are consistent with that research. The students most at risk of committing violence or having suicidal thoughts and behavior are the ones who are alienated from school and their community. Connecting them to school and services is essential. School-based prevention programs designed to improve coping and conflict-resolution skills, emotional awareness and self-control have shown decreases in risk for violence and self-harm as well as improvements in academic success and positive emotional wellbeing (Alicea, Pardo, Conover, Gopalan, & McKay, 2012; Bryan et al., 2012; Eggert, Thompson, Herting, & Nicholas, 1995; Garcia, Pintor, & Lindgren, 2010; Hahn et al., 2007; Kidger, Araya, Donovan, & Gunnell, 2012; Lazear, Roggenbaum, & Blase, 2003; Roggenbaum & Lazear, 2011; Suicide Prevention Resource Center; Thompson et al., 2001; University of Colorado Boulder. Center for the Study and Prevention of Violence. Institute of Behavioral Science). For example, a systematic review of 53 studies evaluating school-based youth violence prevention programs by the Community Preventive Services Task Force (Community Guide) found that these programs were associated with reductions in youth violent behavior, particularly among high-school students (Hahn et al., 2007). Also, Thompson and colleagues (2001) found that youth enrolled in either two school-based suicide prevention programs, C-Care (Counselors-Care) and CAST (Coping and Support Training) – programs intended to improve coping skills and social networks with parents and school personnel – had faster rates of decline in suicidal ideation than youth receiving treatment as usual. Many of these programs were effective in different types of school environments, regardless of socioeconomic status, crime rate, or predominant ethnicity of students (Hahn et al., 2007).

In light of these findings, several limitations with the data and the study design must be considered. First, our findings cannot be generalized to youth in settings other than high-risk urban communities. Second, the study used a cross-sectional study design; therefore, it cannot infer causal relationships between the characteristics and VSG behavior. Third, the information in this study relied on self-reports. Results from previous research indicate that the validity and honesty of self-reports increases when the data are collected anonymously, as was done for this survey (Williams, Eng, Botvin, Hill, & Wynder, 1979). However, we must remain cautious about other limitations of self-reported data, specifically with the ability of the respondent to perceive or recall significant exposures or behaviors. Fourth, the original survey was administered in a school setting and so these findings do not reflect youth who were either expelled from school or have dropped out. Fifth, findings on differences between VSG youth and the other groups with regard to racial/ethnic status must be viewed cautiously. Despite the fact that the study population resided in a high-risk community, differences in the prevalence of VSG by race/ethnicity are most likely confounded by differences in community-level resources and socio-economic environments. Sixth, while our analysis controlled for sex, small female samples in some study groups precluded us from making between-group comparisons by sex. Larger studies are needed to test interaction by sex. Seventh, small sample sizes among the gun-carrying comparison groups precluded thorough comparisons; however, we did attempt these comparisons and found that a higher proportion of VSG youth had high scores for depressive symptoms than violent-only/gun-carrying youth in the bivariate analysis (60.6% versus 13.8%, $p<0.01$) and

depressive symptoms remained a significant predictor of VSG in the adjusted analysis (data not shown). Last, the age of our data were concerning; however, data that captured the combined histories of violent behaviors, suicidal tendencies, and gun carrying were rare, no study has explored the characteristics of this youth group that is in need of attention, and we found that our results can inform current prevention strategies.

Conclusions

Youth with combined histories of interpersonal violence, suicidal ideation/behavior, and gun-carrying might be at risk for perpetrating fatal violence. Family-focused interventions and school-based programs that increase school connectedness and reduce delinquent behaviors and illicit substance use during early adolescence might help prevent youth from developing these violent behavioral patterns. One challenge to these programs is the ability to reeducate and socialize youth after they have developed violent and suicidal thoughts and behaviors, a time when they are more likely to be defiant toward parental guidance and school authorities. Therefore, we must think of these programs within the context of a primary prevention strategy and implement them before youth violent tendencies begin to develop.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Biographies

Joseph E. Logan, PhD, is a scientist at the Centers for Disease Control and Prevention with a background in health services research. His research focuses on the public health approach to violence prevention in the areas of youth violence, suicide, unintentional drug overdose, and homicide-followed-by-suicide.

Kevin J. Vagi, PhD, is a scientist at the Centers for Disease Control and Prevention with a background in developmental psychology. His work aims to improve understanding of community-level influences on youth violence and suicidal behavior.

Deborah Gorman-Smith, PhD, is the Emily Klein Gidwitz Professor at the University of Chicago School of Social Service Administration and Principal Investigator and Director of the Chicago Center for Youth Violence Prevention, one of six national Academic Centers of Excellence funded by the Centers for Disease Control and Prevention.

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Table 1

Characteristics of Study Population (N=3,931)

	No.	(%)
Demographic		
Age		
12–13 years or younger	1,182	30.1%
14–15 years	1,110	28.2%
16 years or older	1,615	41.1%
Unknown	24	0.6%
Sex		
Female	2,097	53.4%
Male	1,812	46.1%
Unknown	22	0.6%
Race/ethnicity		
Non-Hispanic white	901	22.9%
Hispanic	1,718	43.7%
Non-Hispanic black	957	24.3%
Other non-Hispanic minority	307	7.8%
Unknown	48	1.2%
Known Risk Factors		
Having some exposure of:		
Friends who engage in delinquent behaviors	2,003	51.0%
Peer-violence victimization	2,137	54.4%
Depressive symptoms	1,368	34.8%
Illicit substance use	2,119	53.9%
Known Protective Factors		
Having some exposure of:		
School connectedness	1,557	39.6%
Parental caring	2,365	60.2%
Parental supervision	3,030	77.1%

Table 2

Characteristics of Youth with Histories of Violence, Suicidal Thoughts/Behaviors, and Gun-Carrying (VSG) Versus Youth Without These Histories, Adjusted Prevalence Ratios and 99% Confidence Intervals

	VSG (N=66)		Nonviolent/Nonsuicidal (N=1,839)				
	No.	(%)[a]	No.	(%)[a]	P-value[b]	%VSG[c]	Adjusted Prevalence Ratios and 99% Confidence Intervals[d]
Age					0.31		
12–13 years	17	25.8%	615	33.4%		2.7%	referent
14–15 years	20	30.3%	490	26.6%		3.9%	1.28 (0.70–2.34)
16+ years	28	42.4%	723	39.3%		3.7%	0.48 (0.25–0.92)
Sex					<0.01		
Female	13	19.7%	906	49.3%		1.4%	referent
Male	50	75.8%	921	50.1%		5.1%	2.23 (1.18–4.23)
Race/ethnicity					0.07		
Non-Hispanic white	9	13.6%	442	24.0%		2.0%	referent
Hispanic	38	57.6%	790	43.0%		4.6%	1.90 (0.99–3.65)
Non-Hispanic black	12	18.2%	461	25.1%		2.5%	1.39 (0.72–2.67)
Other non-Hispanic minority	6	9.1%	123	6.7%		4.7%	1.69 (0.41–6.94)
Friends who engage in delinquent behaviors					<0.01		
Low/moderate score	5	7.6%	1421	77.3%		0.4%	referent
High score	60	90.9%	390	21.2%		13.3%	7.03 (1.85–26.66)
Peer-violence victimization					<0.01		
Low score	16	24.2%	1083	58.9%		1.5%	referent
Moderate score	9	13.6%	441	24.0%		2.0%	1.06 (0.39–2.89)
High score	38	57.6%	229	12.5%		14.2%	3.43 (1.73–6.81)
Depressive symptoms					<0.01		
Low score	6	9.1%	817	44.4%		0.7%	referent
Moderate score	19	28.8%	674	36.7%		2.7%	2.59 (0.99–6.80)
High score	40	60.6%	280	15.2%		12.5%	5.72 (1.80–18.22)
Illicit substance use					<0.01		
Low/moderate score	5	7.6%	1487	80.9%		0.3%	referent
High score	61	92.4%	341	18.5%		15.2%	12.90 (3.51–47.39)

	VSG (N=66)		Nonviolent/Nonsuicidal (N=1,839)				
	No.	**(%)[a]**	**No.**	**(%)[a]**	**P-value[b]**	**%VSG[c]**	**Adjusted Prevalence Ratios and 99% Confidence Intervals[d]**
School connectedness					<0.01		
Low score	41	62.1%	475	25.8%		7.9%	referent
Moderate score	11	16.7%	507	27.6%		2.1%	0.58 (0.32–1.03)
High score	13	19.7%	828	45.0%		1.5%	0.50 (0.31–0.81)
Parental caring					<0.01		
Low score	32	48.5%	403	21.9%		7.4%	referent
Moderate score	22	33.3%	685	37.2%		3.1%	0.67 (0.36–1.23)
High score	12	18.2%	726	39.5%		1.6%	1.67 (0.78–3.59)
Parental supervision					<0.01		
Low score	45	68.2%	491	26.7%		8.4%	referent
Moderate score	15	22.7%	588	32.0%		2.5%	0.62 (0.34–1.14)
High score	6	9.1%	751	40.8%		0.8%	0.33 (0.12–0.86)

[a] The number and percent with unknown values were not displayed therefore the percentages might not equal 100%. The proportion with unknown values did not exceed 5% for any variable for either group.

[b] Bivariate Fisher's exact tests were used to estimate p-values.

[c] %VSG = (No. VSG/No. VSG + No. nonviolent/nonsuicidal youth) X 100

[d] Prevalence ratios were adjusted for all variables in the table as well as any differences in unknown values between groups.

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Table 3

Characteristics of Youth with Histories of Violence, Suicidal Thoughts/Behaviors, and Gun-Carrying (VSG) Versus Youth with Histories of Violence-Only (Non-Gun Carrying), Adjusted Prevalence Ratios and 99% Confidence Intervals

	VSG (N=66)		Violent-only (N=884)				
	No.	(%)[a]	No.	(%)[a]	P-value[b]	%VSG[c]	Adjusted Prevalence Ratios and 99% Confidence Intervals[d]
Age					0.55		
12–13 years	17	25.8%	242	27.4%		6.6%	referent
14–15 years	20	30.3%	266	30.1%		7.0%	0.69 (0.34–1.42)
16+ years	28	42.4%	372	42.1%		7.0%	0.36 (0.21–0.60)
Sex					<0.01		
Female	13	19.7%	416	47.1%		3.0%	referent
Male	50	75.8%	466	52.7%		9.7%	2.68 (1.35–5.32)
Race/ethnicity					0.12		
Non-Hispanic white	9	13.6%	167	18.9%		5.1%	referent
Hispanic	38	57.6%	385	43.6%		9.0%	1.94 (1.00–3.73)
Non-Hispanic black	12	18.2%	253	28.6%		4.5%	1.21 (0.63–2.35)
Other non-Hispanic minority	6	9.1%	72	8.1%		7.7%	1.45 (0.44–4.76)
Friends who engage in delinquent behaviors					<0.01		
Low/moderate score	5	7.6%	497	56.2%		1.0%	referent
High score	60	90.9%	377	42.7%		13.7%	4.49 (1.30–15.51)
Peer-violence victimization					0.10		
Low score	16	24.2%	212	24.0%		7.0%	referent
Moderate score	9	13.6%	230	26.0%		3.8%	0.57 (0.24–1.31)
High score	38	57.6%	409	46.3%		8.5%	1.11 (0.46–2.67)
Depressive symptoms					<0.01		
Low score	6	9.1%	278	31.5%		2.1%	referent
Moderate score	19	28.8%	367	41.5%		4.9%	2.23 (0.89–5.64)
High score	40	60.6%	212	24.0%		15.9%	5.17 (1.74–15.34)
Illicit substance use					<0.01		
Low/moderate score	5	7.6%	593	67.1%		0.8%	referent
High score	61	92.4%	290	32.8%		17.4%	11.23 (3.44–36.63)

	VSG (N=66)		Violent-only (N=884)				
	No.	**(%)[a]**	**No.**	**(%)[a]**	**P-value[b]**	**%VSG[c]**	**Adjusted Prevalence Ratios and 99% Confidence Intervals[d]**
School connectedness					<0.01		
Low score	41	62.1%	252	28.5%		14.0%	referent
Moderate score	11	16.7%	292	33.0%		3.6%	0.39 (0.19–0.80)
High score	13	19.7%	334	37.8%		3.7%	0.48 (0.26–0.87)
Parental caring					<0.01		
Low score	32	48.5%	256	29.0%		11.1%	referent
Moderate score	22	33.3%	314	35.5%		6.5%	0.63 (0.37–1.09)
High score	12	18.2%	309	35.0%		3.7%	1.02 (0.46–2.29)
Parental supervision					<0.01		
Low score	45	68.2%	307	34.7%		12.8%	referent
Moderate score	15	22.7%	305	34.5%		4.7%	0.75 (0.34–1.66)
High score	6	9.1%	271	30.7%		2.2%	0.46 (0.12–1.82)

[a] The number and percent with unknown values were not displayed therefore the percentages might not equal 100%. The proportion with unknown values did not exceed 5% for any variable for either group.

[b] Bivariate Fisher's exact tests were used to estimate p-values.

[c] %VSG = (No. VSG/No. VSG + No. violent-only youth) X 100

[d] Prevalence ratios were adjusted for all variables in the table as well as any differences in unknown values between groups.

Table 4

Characteristics of Youth with Histories of Violence, Suicidal Thoughts/Behaviors, and Gun-Carrying (VSG) Versus Youth with Histories of Suicidal Thoughts/Behaviors-Only (Non-Gun Carrying), Adjusted Prevalence Ratios and 99% Confidence Intervals

	VSG (N=66)		Suicidal-only (N=552)				
	No.	(%)[a]	No.	(%)[a]	P-value[b]	%VSG[c]	Adjusted Prevalence Ratios and 99% Confidence Intervals[d]
Age					0.38		
12–13 years	17	25.8%	155	28.1%		9.9%	referent
14–15 years	20	30.3%	142	25.7%		12.3%	0.64 (0.33–1.27)
16+ years	28	42.4%	253	45.8%		10.0%	0.54 (0.33–0.90)
Sex					<0.01		
Female	13	19.7%	372	67.4%		3.4%	referent
Male	50	75.8%	177	32.1%		22.0%	3.82 (1.95–7.50)
Race/ethnicity					0.19		
Non-Hispanic white	9	13.6%	141	25.5%		6.0%	referent
Hispanic	38	57.6%	249	45.1%		13.2%	2.25 (1.37–3.70)
Non-Hispanic black	12	18.2%	107	19.4%		10.1%	1.31 (0.81–2.12)
Other non-Hispanic minority	6	9.1%	47	8.5%		11.3%	1.78 (0.72–4.39)
Friends who engage in delinquent behaviors					<0.01		
Low/moderate score	5	7.6%	398	72.1%		1.2%	referent
High score	60	90.9%	147	26.6%		29.0%	6.16 (1.54–24.70)
Peer-violence victimization					<0.01		
Low score	16	24.2%	228	41.3%		6.6%	referent
Moderate score	9	13.6%	154	27.9%		5.5%	0.85 (0.37–1.96)
High score	38	57.6%	149	27.0%		20.3%	1.58 (0.73–3.45)
Depressive symptoms					0.69		
Low score	6	9.1%	74	13.4%		7.5%	referent
Moderate score	19	28.8%	173	31.3%		9.9%	1.42 (0.46–4.38)
High score	40	60.6%	295	53.4%		11.9%	1.43 (0.50–4.11)
Illicit substance use					<0.01		
Low/moderate score	5	7.6%	393	71.2%		1.3%	referent
High score	61	92.4%	159	28.8%		27.7%	8.34 (2.09–33.25)

	VSG (N=66)		Suicidal-only (N=552)				
	No.	**(%)[a]**	**No.**	**(%)[a]**	**P-value[b]**	**%VSG[c]**	**Adjusted Prevalence Ratios and 99% Confidence Intervals[d]**
School connectedness					<0.01		
Low score	41	62.1%	203	36.8%		16.8%	referent
Moderate score	11	16.7%	151	27.4%		6.8%	0.93 (0.55–1.58)
High score	13	19.7%	195	35.3%		6.3%	0.67 (0.32–1.42)
Parental caring					0.55		
Low score	32	48.5%	225	40.8%		12.5%	referent
Moderate score	22	33.3%	186	33.7%		10.6%	0.83 (0.51–1.34)
High score	12	18.2%	137	24.8%		8.1%	1.47 (0.56–3.82)
Parental supervision					<0.01		
Low score	45	68.2%	167	30.3%		21.2%	referent
Moderate score	15	22.7%	172	31.2%		8.0%	0.74 (0.30–1.85)
High score	6	9.1%	213	38.6%		2.7%	0.34 (0.09–1.25)

[a] The number and percent with unknown values were not displayed therefore the percentages might not equal 100%. The proportion with unknown values did not exceed 5% for any variable for either group.

[b] Bivariate Fisher's exact tests were used to estimate p-values.

[c] %VSG = (No. VSG/No. VSG + No. suicidal-only youth) X 100

[d] Prevalence ratios were adjusted for all variables in the table as well as any differences in unknown values between groups.

Table 5

Characteristics of Youth with Histories of Violence, Suicidal Thoughts/Behaviors, and Gun-Carrying (VSG) Versus Youth with Histories of Violence and Suicidal Thoughts/Behaviors (Non-Gun Carrying), Adjusted Prevalence Ratios and 99% Confidence Intervals

	VSG (N=66)		Violent/Suicidal (N=590)				
	No.	(%)[a]	No.	(%)[a]	P-value[b]	%VSG[c]	Adjusted Prevalence Ratios and 99% Confidence Intervals[d]
Age					0.85		
12–13 years	17	25.8%	153	25.9%		10.0%	referent
14–15 years	20	30.3%	192	32.5%		9.4%	0.90 (0.32–2.53)
16+ years	28	42.4%	239	40.5%		10.5%	0.64 (0.25–1.64)
Sex					<0.01		
Female	13	19.7%	390	66.1%		3.2%	referent
Male	50	75.8%	198	33.6%		20.2%	5.01 (2.39–10.48)
Race/ethnicity					0.19		
Non-Hispanic white	9	13.6%	142	24.1%		6.0%	referent
Hispanic	38	57.6%	256	43.4%		12.9%	2.23 (1.41–3.53)
Non-Hispanic black	12	18.2%	124	21.0%		8.8%	1.43 (0.63–3.29)
Other non-Hispanic minority	6	9.1%	59	10.0%		9.2%	1.35 (0.33–5.58)
Friends who engage in delinquent behaviors					<0.01		
Low/moderate score	5	7.6%	295	50.0%		1.7%	referent
High score	60	90.9%	291	49.3%		17.1%	3.98 (0.83–19.05)
Peer-violence victimization					0.09		
Low score	16	24.2%	99	16.8%		13.9%	referent
Moderate score	9	13.6%	140	23.7%		6.0%	0.48 (0.20–1.14)
High score	38	57.6%	338	57.3%		10.1%	0.78 (0.29–2.10)
Depressive symptoms					0.95		
Low score	6	9.1%	50	8.5%		10.7%	referent
Moderate score	19	28.8%	189	32.0%		9.1%	1.20 (0.24–6.01)
High score	40	60.6%	340	57.6%		10.5%	1.24 (0.30–5.14)
Illicit substance use					<0.01		
Low/moderate score	5	7.6%	328	55.6%		1.5%	referent
High score	61	92.4%	261	44.2%		18.9%	6.89 (2.00–23.73)

	VSG (N=66)		Violent/Suicidal (N=590)				
	No.	**(%)[a]**	**No.**	**(%)[a]**	**P-value[b]**	**%VSG[c]**	**Adjusted Prevalence Ratios and 99% Confidence Intervals[d]**
School connectedness					<0.01		
Low score	41	62.1%	229	38.8%		15.2%	referent
Moderate score	11	16.7%	171	29.0%		6.0%	0.59 (0.30–1.16)
High score	13	19.7%	187	31.7%		6.5%	0.48 (0.26–0.86)
Parental caring					0.562		
Low score	32	48.5%	236	40.0%		11.9%	referent
Moderate score	22	33.3%	209	35.4%		9.5%	0.90 (0.63–1.28)
High score	12	18.2%	142	24.1%		7.8%	0.99 (0.40–2.45)
Parental supervision					<0.01		
Low score	45	68.2%	233	39.5%		16.2%	referent
Moderate score	15	22.7%	209	35.4%		6.7%	0.75 (0.33–1.71)
High score	6	9.1%	147	24.9%		3.9%	0.52 (0.12–2.24)

[a] The number and percent with unknown values were not displayed therefore the percentages might not equal 100%. The proportion with unknown values did not exceed 5% for any variable for either group.

[b] Bivariate Fisher's exact tests were used to estimate p-values.

[c] %VSG = (No. VSG/No. VSG + No. violent/suicidal youth) X 100

[d] Prevalence ratios were adjusted for all variables in the table as well as any differences in unknown values between groups.