Examining the Arsenal of Juvenile Gunslingers: Trends and Policy Implications

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Using the National Institute of Justice body armor threat-level scale, this study classified 1,055 firearms confiscated by police officers from juveniles in St. Louis, Missouri, from 1992 to 1999. The authors found that for this city, the lethal capacity of juveniles' firearms has remained relatively constant over time. Examination of the different types of firearms recovered also found that the sophistication of firearms used by juveniles did not increase throughout the 1990s. By disaggregating firearm types, the authors were able to demonstrate that the police are likely to confiscate relatively unsophisticated firearms from juveniles, such as Saturday night specials, .22 caliber and nonpowder weapons. In St. Louis, juveniles were very unlikely to have an assault weapon confiscated. More troubling, however, were the relatively high numbers of illegally sawed-off rifles and shotguns recovered from youths.

Keywords: *juvenile gun use; youth violence*

Our perceptions about juvenile firearms possession and use are inextricably linked with media depictions of youth gang activities and accounts of school shootings. The general public may believe that youths have access to sophisticated military-style assault weapons that have a high capacity for lethality. Police officials tend to reinforce these perspectives by reporting that youths are gaining access to increasingly sophisticated firearms over time (Bjerregaard & Lizotte, 1995). These images of juvenile gunslingers with assault weapons largely have displaced our fear of juveniles using Saturday night specials, the inexpensive and easily concealed handguns that fire less powerful cartridges (Cook, 1991; Funk, 1995; Shine, 1998).

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Juveniles and young adults made a significant contribution to the increases in homicide rates throughout the 1980s and 1990s (Cole, 1999; Fingerhut, Ingram, & Feldman, 1998), and whereas rates of violent juvenile crime have decreased, there is a significant positive association between youth gun violence and homicide (Cherry, Annest, Mercy, Kresnow, & Pollock, 1998; Wintemute, 2000; Zimring, 1998). Juveniles were responsible for approximately one third of the increase in murders during the 1985 to 1994 period (Snyder, Sickmund, & Poe-Yamagata, 1996), but increases in homicides are not attributable to young persons alone. Analysis of the FBI Supplemental Homicide Reports found that the homicide commission and victimization rates for 13- to 17-year-old and 18- to 24-year-old males during the late 1980s and early 1990s were similar (Cook & Laub, 1998). From 1983 to 1992, the Violent Crime Index arrest rate increased among all age groups (Snyder & Sickmund, 1995, p. 112), and the increase was larger (66%) among 30- to 49-year-olds than among any other age group, including teenagers (Males, 1997).

Often the presence of a firearm in the hands of a juvenile increases the lethality of confrontations that otherwise may be resolved by alternative means (Wilkinson & Fagan, 1996). Youths who are involved in illicit drug markets or gangs are also more likely to possess or use firearms, and these activities increase the potential for lethal violence (Bjerregaard & Lizotte, 1995; Blumstein & Cork, 1996; Hemenway, Prothrow-Stith, Bergstein, Ander, & Kennedy, 1996; Lizotte, Krohn, Howell, Tobin, & Howard, 2000).

Irrespective of other factors, the calibers of weapons that offenders use are likely to influence the homicide rate (Zimring, 1972). Koper (1995) observed that "criminologists have long recognized the importance of determining the impact of weapon types on the volume, patterns, and lethality of violence" (p. 1). It has been hypothesized, for instance, that the growing use of semiautomatic handguns and handguns of larger calibers have a direct positive association with increases in homicides (Block & Block, 1993; McGonigal et al., 1993; Wintemute, 1996, 2000). In his analysis of crime-guns confiscated from Kansas City, Missouri, offenders from 1985 to 1993, Koper found that the use of firearms with larger bore sizes significantly influences the homicide rate: Weapon caliber is a better predictor of lethality than whether a firearm is a revolver, semiautomatic or single shot. Consistent with these observations, Caruso, Jara, and Swan (1999) used autopsy data to establish that the average caliber of bullets in fatal shootings has been increasing over time.

Concerns over youth gun violence have resulted in a number of policy initiatives, including the expansion of federal, state, and municipal legislation to increase the consequences for illegal firearm acquisition and use (Kopel, 1994). A number of innovative harm-reduction strategies to reduce the use by

youngsters also have been introduced (Bureau of Alcohol, Tobacco and Firearms [BATF], 1999b; Kennedy, 1997; Kennedy, Piehl, & Braga, 1996; Rosenfeld & Decker, 1996; Scales & Baker, 2000). It is our contention that interventions should be based on demonstrable research results about juvenile gun offenses rather than anecdotal information or media portrayals.

Most of our knowledge about juvenile firearms use is a product of interviews with incarcerated juvenile offenders (Birkbeck et al., 1999; Callahan, Rivara, & Farrow, 1993; Limber & Pagliocca, 1998; Sheley & Wright, 1993) or samples drawn from youths in the community (Bjerregaard & Lizotte, 1995; Hemenway et al., 1996; Sadowski, Cairns, & Earp, 1989; Sheley & Brewer, 1995; Sheley & Wright, 1998). The BATF also has traced firearms used in juvenile offenses in 27 metropolitan areas at the request of local police departments. Previous research strategies, however, might not be representative of the actual types of firearms the average juvenile offender is likely to possess or use. As a result of these limitations, this study examines 1,055 firearms confiscated by the police department in St. Louis, Missouri, from January 1, 1992, to December 31, 1999, to determine whether juveniles are using more sophisticated firearms over time. We also examined several subtypes of firearms including Saturday night specials, assault weapons, and inherently illegal firearms: rifles or shotguns that have their barrels or stocks illegally sawed off or any firearm that has its serial number altered or defaced in violation of the 1934 National Firearms Act (NFA).

YOUTH GUN USE

Previous studies of confiscated firearms generally have disaggregated them into broad classifications such as handguns, rifles, and shotguns (BATF, 1977; Brill, 1977; Little & Boyen, 1990; Wachtel, 1998). This research typically has found that handguns are more likely to be seized by the police than either rifles or shotguns. Additionally, these studies have demonstrated the widespread confiscation of Saturday night specials (BATF, 1977; Little & Boyen, 1990) and the relative scarcity of assault weapons (Kopel, 1994; Koper, 1995). Recent evidence from Los Angeles, however, suggests that there are trends in firearms use, and that most law-abiding citizens, as well as their criminal counterparts, prefer large-caliber semiautomatic handguns such as the 9mm (Wachtel, 1998). Examination of firearm industry trends also demonstrates that the production of larger caliber semiautomatic handguns has increased substantially over the past two decades (Wintemute, 2000).

One limitation of the firearms literature to date is that scholars have not examined trends in firearms confiscated from individuals legally defined as juveniles but, instead, have included all persons younger than 21 years of age, classifying them as young adults (Kennedy et al., 1996). This approach has some basis in legislation, given that the Gun Control Act of 1968 made handgun sales to those younger than 21 illegal, but such designations do not help us understand gun use of persons legally defined as juveniles. In an attempt to better understand juvenile gun acquisition and use, the BATF (1999b) traced juvenile crime-guns in 27 metropolitan areas and found that these guns represented 11.3% of all firearms traced nationally. In addition to finding that there are regional differences in juvenile firearms use, the BATF reported that the modal juvenile crime handgun throughout the nation is a semiautomatic pistol.

A number of self-report surveys and interviews also have increased our understanding of juvenile gun possession. Drug Use Forecasting survey information has been utilized by Rosenfeld and Decker (1996) to examine firearms use in a sample of one hundred twenty-eight 12- to 16-year-old detention residents, and 53% of this group reported possessing a firearm at some point. From these data, Rosenfeld and Decker estimated that

> Some 26 percent of African-American males aged 12 to 16 years have owned or possessed a firearm in their lifetime; fourteen percent have possessed a firearm during the previous month; six percent always carry a gun, seven percent have used a gun to commit a crime, and eight percent have stolen a gun. (p. 209)

Survey research suggests that these samples may be representative of national youth gun use (Hemenway et al., 1996; Sadowski et al., 1989; Sheley & Wright, 1998).

Although interviews of youths in detention or custody facilities may provide some insights into the reasons why youngsters possess or carry guns, there are some methodological weaknesses in attributing the firearm experiences of persistent or serious offenders to all youths. Data from 380 incarcerated youths in New Mexico, for instance, suggest that a number of juveniles carry firearms for self-defense or aggression rather than to enhance their status (Birkbeck et al., 1999). Sheley and Wright (1993) also interviewed incarcerated youths and found that

> Inmates are more likely to have owned guns, to have carried guns and have had ready access to guns, to own assault-style weapons, to have owned sawed-off shotguns and have owned semi-automatic pistols. (p. 64)

A review of firearms involved in crimes, however, demonstrates that military-style assault weapons are used in less than 1% of all firearms offenses (Kopel, 1994). Accordingly, one can extrapolate that some juveniles may be exaggerating their involvement with such weapons.

Traces of 152 juvenile crime-guns in St. Louis established that semiautomatic pistols and revolvers are commonly encountered, representing 35.8% and 27% of all crime-guns, respectively, and the modal juvenile crime-gun in St. Louis was a Smith and Wesson .38 Special caliber revolver (BATF, 1999a). Of these St. Louis juvenile crime-guns, 61.8% were involved in firearms offenses, 18.4% in narcotics offenses, 10% in robberies, 8% in assaults, and none in homicides. A significant weakness of tracing only these crime-involved guns, however, is the fact that these firearms are not randomly selected, and police requests to trace firearms potentially reflect some degree of selection bias.

Using a sample of 8,290 firearms confiscated in St. Louis from 1992 to 1994, Ruddell (2000) compared adult and juvenile gun use and found that juveniles are likely to possess less sophisticated firearms than their adult counterparts. Whereas the police were likely to recover large-caliber handguns, rifles, and shotguns from adults, juveniles were more likely to possess nonpowder firearms (BB guns and pellet guns), Saturday night specials, and illegally sawed-off rifles and shotguns. This study used the National Institute of Justice (NIJ) body armor rating scale to classify the threat level of these seized firearms and demonstrated how this scale can be used to study trends in firearms use.

The current research expands our understanding of juvenile firearms use by examining two questions. First, over time, have juveniles started carrying more lethal firearms? The NIJ threat-level scale is used as a method of classifying the capacity of lethality for these seized firearms. Second, this study classifies firearms into commonly used categories such as Saturday night specials, assault weapons, and illegally sawed-off rifles and shotguns to assess whether police are likely to recover more sophisticated weapons from juveniles over time.

RESEARCH DESIGN

Between January 1, 1992, and December 31, 1999, 1,055 firearms were confiscated from persons legally defined as juveniles by the St. Louis, Missouri, Metropolitan Police Department. Juvenile firearms possession is an offense, so any firearm used by a juvenile without adult supervision is likely

to be confiscated by the police. Nonpowder firearms, such as BB and pellet guns, also are included in the analysis as they are typically recovered from youths (Ruddell, 2000). The dates for this research were determined by the availability of data. One of the major limitations in operationalizing firearms trend research is that few jurisdictions have collected such data over time, and fewer have disaggregated these data into categories of juveniles and adults. Although the St. Louis data help us understand the types of firearms recovered from juveniles, they also are limited because we have no information about the demographic characteristics of the juveniles other than the fact that the weapons were seized from persons under the age of 17 years. As a result, we cannot determine from these data whether these firearms were seized from younger or older juveniles, their race, gender, or the seriousness of their alleged offenses.

The capacity for lethality of firearms in this research is categorized using the NIJ (1998) body armor classification ratings. Body armor, typically called "bullet proof vests," distributed in the United States is rated on a five-level scale for its ability to withstand penetration by different cartridges.[1] We added one additional classification—for weapons with a very low capacity for injury—to the lower end of the scale to account for BB and pellet guns. We believe we have employed a conservative approach in classifying threat levels. Where a caliber was listed in two threat-level classifications due to different types of ammunition or longer barrel lengths that increased the velocity of the bullet, it was placed in the higher classification. The .38 Special cartridge, for instance, is rated in both the Type I and Type IIa body armor classifications, so it was placed in the higher classification. The .45 Automatic Colt Pistol (ACP) cartridge, categorized as a Type IIa threat by the NIJ, was also placed in a higher classification due to its widely acknowledged lethality (Kleck, 1991; Wintemute, 1996, 2000).[2] Table 1 outlines how the NIJ scale has been adapted to classify the capacity for injury or lethality into six threat levels. A review of the literature finds that classification of cartridges into categories using a modified NIJ scale is consistent with observations about cartridge lethality made by Kleck (1991) and Wintemute (1996, 2000). Koper's (1995) analysis of the lethality of firearms suggests that irrespective of other factors, a weapon's caliber has the greatest influence on lethality.

We recognize that adapting the NIJ scale to assess the threat of firearm cartridges offers a somewhat simplistic solution to a complex issue. The lethality of wounds from firearms is related to a variety of factors, including the design of the bullet used (e.g., a full metal jacket bullet that is less likely to expand than a hollow point bullet), the velocity of the bullet (a product of both the barrel length and the amount of powder used), the weight of the bullet (Di Maio,

TABLE 1: Modified National Institute of Justice (NIJ) Threat-Level Scale

Level 1	Pellet and BB firearms.
Level 2	(Type I) Smaller handgun rounds, including .25 and .32 calibers. This classification includes the .22 rimfire, in either handguns or rifles.
Level 3	(Type II-A) Medium-caliber handgun rounds, including the .38 Special, .380 automatic and, 9 × 18 Makarov.
Level 4	(Type II) Medium-caliber, high-velocity handgun rounds, including the 9mm, .357 magnum, .40 Smith and Wesson, .44 special, and .45 Automatic Colt Pistol.
Level 5	(Type III-A) Large-caliber, high-velocity handgun rounds, such as the .41 and .44 magnums.
Level 6	(Type III) High-powered rifle calibers, such as the .223 Remington and 7.62 × 39mm. As rifled shotgun slugs were in this classification, all shotgun gauges, from .410 to 10 gauge, are included in this threat level.

1985), and bullet placement. There is very little agreement, however, in the wound ballistics literature about the lethality of handgun cartridges (Fackler, 1999; Marshall & Sanow, 1996; Van Maanen, 1999). Again, our data were limited somewhat as there was no information about the type of cartridge that was recovered with the firearms. Hence, a .357 magnum revolver could be loaded with .38 Special ammunition that has a lower threat level. To account for the variation in the type of cartridges chambered in these firearms, we assumed that the most lethal cartridges were used in any firearm recovered by police when classifying the threat levels.

As a result of the wide disagreement in the wound ballistics literature about the nature of threat posed by various handgun cartridges, two other measures of threat were also examined in this study: muzzle energy and Marshall and Sanow's (1996) stopping power classification. Muzzle energy refers to the kinetic energy created by the velocity and weight of the bullet. Marshall and Sanow, by contrast, based their ratings on the percentage likelihood of a single bullet's ability to incapacitate an individual if hit in the torso. Their data have an intuitive appeal as they are based on actual reports of shootings, but this approach has been widely criticized for methodological weaknesses (Fackler, 1999; Van Maanen, 1999).

The appendix outlines how Marshall and Sanow's (1996) stopping power data, the muzzle energy statistics, and the NIJ threat scale are very highly correlated; the apparent differences are further reduced when only handgun cartridges are examined.[3]

The NIJ scale does not account for issues of firearms design, and all other factors being equal, a semiautomatic pistol or rifle that has a magazine capacity of 15 rounds theoretically poses a greater potential threat than a single-

shot firearm that must be reloaded after every shot. In addition, more expensive weapons that are both more accurate and mechanically reliable are potentially more threatening than their cheaper and less reliable counterparts. To account for differences in firearm design, the present study also examined the types of firearm seized. We broadly classified these firearms into rifles, shotguns, and handguns, then disaggregated these three types into commonly used classifications, such as Saturday night specials or assault firearms.

Data from the St. Louis Metropolitan Police Department are limited somewhat by the type of information collected and their accuracy. Several cases that were missing data were excluded from the analysis, as were toy firearms or blank pistols. Data were coded, and some precision was lost due to rounding (e.g., barrel lengths were rounded to the nearest quarter inch).

Additionally, recent examination of juvenile crime-guns has found that firearms less than 3 years old are more likely to be involved in crimes (BATF, 1999b). However, the ages of the firearms seized were not available, making it impossible to determine whether the firearms seized were recently sold or whether they were part of the existing 220 to 250 million firearms currently in circulation in the United States.

Table 2 illustrates that there was a significant variance in the annual number of firearms recovered by the police. Throughout the decade, juvenile gun confiscation decreased annually. From 1992 to 1994, for instance, the average number of firearms recovered by the police was 201 per year. By contrast, between 1996 and 1999, the average number of recovered firearms had decreased to 54 per year. There are two major reasons why the number of firearms seized from juveniles may have decreased over time. First, gun crimes, for both juveniles and adults, decreased in the United States throughout the 1990s. In St. Louis, for instance, the number of aggravated assaults with guns dropped substantially during the era of this study. Consistent with national trends, the annual number of St. Louis homicides dropped as well. Table 2 demonstrates how aggravated assaults with firearms dropped by more than 50% during the era of this study. There was also a corresponding decrease in homicides in St. Louis. It is also likely that reductions in funding to the St. Louis Police Department's Mobile Reserve also contributed to these decreases in the number of firearms seized, because a primary mission of this unit is firearms suppression.

RESULTS

Examination of firearms confiscated from juveniles from 1992 to 1999 shows variation in their threat level over time. When all firearms are consid-

TABLE 2: Trends in Threat Levels of Firearms Confiscated from St. Louis, Missouri, Juveniles, 1992-1999

	Threat Levels of Firearms Confiscated from St. Louis, Missouri, Juveniles, 1992-1999								
	1992	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*Mean*
Guns confiscated	183	238	183	169	110	65	59	48	131.80
Average	2.71	2.53	2.68	2.76	2.80	2.77	3.15	2.27	2.70
Average (less airguns)	3.02	2.69	2.88	2.96	3.15	3.09	3.40	2.69	2.93
Average (less Threat Level 6[a])	2.21	2.25	2.39	2.30	2.29	2.32	2.50	2.11	2.29

Threat Levels of Firearms Confiscated From St. Louis Juveniles, 1992-1999

Level 1	*Level 2*	*Level 3*	*Level 4*	*Level 5*	*Level 6*
134	504	204	95	4	114

	Aggravated Assaults With Firearms and Total Homicides: St. Louis, 1992-1999							
	1992	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*
Aggravated assaults with firearms	3,501	4,320	4,062	3,045	2,308	2,266	1,822	1,651
Total homicides	231	267	248	204	166	153	113	130

a. Most of the firearms that were Threat Level 6 were shotguns (69 of the 95 recovered were illegally sawed-off).

ered, the average threat level ranged from a low of 2.25 in 1999 to a high 3.15 in 1998. Despite the fact that there was a significant variation, there was no overall systematic trend.[4] When the firearms were classified using two alternative measures—muzzle energy and stopping power (Marshall & Sanow, 1996)—the results were very similar, and these scales also demonstrated that there was no significant trend over time. The lack of a significant trend was apparent after nonpowder firearms were removed from the analysis.

Annual threat level means were also assessed when Threat Level 6 firearms were removed from the analysis and the variance was no longer statistically significant. From these findings, we can conclude that the number of Threat Level 6 firearms, which are generally sawed-off shotguns, confiscated in any year, drives the variance: When these firearms are removed from the analysis, there is no significant difference in threat level between the years.

Handguns are the type of firearm most likely to be confiscated from juveniles. The mean threat level for all cartridge sizes of handguns was assessed,

excluding nonpowder firearms, rifles, and shotguns from this analysis. Once these types of firearms were removed, the average threat level of handguns remained almost constant over the 8 years. Again, these findings were consistent after we classified these firearms based on the muzzle energy their cartridges produced or Marshall and Sanow's (1996) stopping power data. Table 2 illustrates that the modal firearm confiscated from juveniles over this 8-year period was in Threat Level 2; this classification includes the .22 long rifle, .25 automatic, and .32 automatic cartridges. Youth crime-gun research in St. Louis previously found that the modal category of youth crime-gun was a .38 Special caliber handgun (BATF, 1999a), yet Table 2 shows that these higher threat-level firearms represent less than 20% of all the firearms recovered. In contrast with the BATF (1999a) data, after rifles, shotguns, and nonpowder firearms were removed from the sample, the modal handgun in this analysis was classified in Threat Level 2. In fact, of the 821 handguns recovered by police, 435 were Threat Level 2 weapons.

According to the BATF (1999a), a majority of the juvenile crime-guns traced in St. Louis were semiautomatic pistols. However, of the 734 cartridge handguns recovered from juveniles over 8 years, revolvers were more likely to be recovered: There were 379 revolvers and 331 semiautomatic pistols. The remaining 24 firearms were black powder guns, single shots or derringers, all of which are fairly antiquated firearms designs. Accordingly, the present study demonstrates that the BATF crime-gun statistics might not be representative of the handguns juveniles are likely to possess.

This finding also tends to affirm the ability of the NIJ scale as a measure of threat. As most cartridge handguns seized from juveniles in this sample have the capacity to fire more than one round, whether the firearm is a semiautomatic pistol or a revolver is relatively unimportant distinction. Semiautomatic pistols typically can hold more cartridges, and the shooter is normally able to fire a semiautomatic more rapidly than a revolver. Kleck (1991), however, correctly noted that the magazine capacity does not significantly influence the outcome of most police encounters with offenders, as relatively few shots are ever fired. As previously noted, Koper (1995) found that the caliber of firearm, rather than the design of the weapon used in a shooting, most often determines the lethality of a gun assault.

Consistent with previous research (BATF, 1977; Little & Boyen, 1990), Saturday night specials were defined as firearms of .32 caliber or less and having a barrel length of 3.1 inches or less (Funk, 1995).[5] These firearms are generally inexpensive—their retail price often ranges from $100.00 to $150.00—easily concealed, and widely distributed (Wintemute, 2000). Therefore, they may be more popular with youths who may have fewer opportunities to purchase more desirable semiautomatic firearms that fire

TABLE 3: Firearms Confiscated From St. Louis, Missouri, Juveniles by Type, 1992-1999

Total firearms	1,055
Handguns	821
Saturday night specials[a]	301
Higher lethality handguns[b]	98
Nonpowder handguns[c]	86
All other cartridge handguns	330
Assault weapons[d]	6
Rifles	139
Sawed-off rifles[e]	27
Nonpowder rifles	48
Other cartridge rifles	64
Assault weapons	0
Shotguns	95
Sawed-off shotguns	69
Other shotguns	26

a. .32 caliber or less, with a barrel length of less than 3.1 inches.
b. All 9mm, .40 Smith & Wesson, .357 magnum, .45 Automatic Colt Pistol, .41 and .44 magnum revolvers and pistols.
c. Typically BB or pellet guns.
d. Assault weapons consist of 19 firearms banned in the 1994 Omnibus Crime Bill.
e. Sawed-off rifles and shotguns defined as per the 1934 National Firearms Act.

9mm or .45 ACP rounds and may have a retail value approaching $600.00.[6] The Saturday night special was the modal category of handgun confiscated in this sample, and Table 3 illustrates how 301 of the total 821 handguns recovered were Saturday night specials. Handguns with a greater threat level, by contrast, were classified separately.

Of the total 821 handguns recovered by police, 98 had the greatest threat level. These weapons chambered cartridges in 9mm, .40 Smith and Wesson, .357 magnum, .45 ACP, and .41 and .44 magnums. Typically, these firearms are better made, more reliable, and more expensive than Saturday night specials. Table 4 illustrates how handguns with the greatest threat level ranged from 5.8% to 12.3% of the annual firearms recovered by the police, but these guns were no more likely to be seized in 1999 than 1992.

The NFA made several types of firearms illegal, including rifles or shotguns that have sawed-off barrels or serial numbers altered or obliterated. Of the entire sample of firearms, 144, or 13.4%, of the weapons recovered by the police were inherently illegal firearms. Due to their illegal status, increased threat level, and ease of concealment, sawed-off rifles and shotguns represent a substantial threat to the police and public safety, and they appear to be commonly encountered. Of the 95 shotguns recovered, for instance, 69 had ille-

TABLE 4: Firearm Types Seized From St. Louis, Missouri, Juveniles, 1992-1999 (in percentages)

	1992	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*
Sawed-off rifles and shotguns (*n* = 96)	12.0	6.7	8.2	11.2	10.0	10.8	10.0	6.0
High threat handguns (*n* = 98)	10.3	5.8	11.5	8.3	12.3	10.8	8.5	8.3
Defaced serial numbers (*n* = 45)	2.2	4.6	6.6	3.0	7.3	4.6	1.7	2.0
Saturday night specials (*n* = 301)	42.0	15.8	24.5	23.6	30.9	24.6	13.6	35.4

gally sawed-off barrels. Again, Table 4 demonstrates how the percentage of sawed-off firearms recovered annually remained relatively stable over the period of this study.

There is considerable public and political concern about the criminal use of assault weapons due to their perceived threat (Kopel, 1994; Roth & Koper, 1999; Wintemute, 1996; Zimring, 1989). In this study, assault weapons were defined using the firearms banned for importation in the 1994 Omnibus Crime Bill.[7] Nevertheless, there is some ambiguity over definitions of assault weapons (Kopel, 1994; Koper, 1995; Wintemute, 1996; Zimring, 1989), and semiautomatic firearms are sometimes labeled as assault weapons based solely on cosmetic reasons such as the presence of a bayonet lug, flash suppressor, or pistol grip (Wachtel, 1998). Regardless of definitions, assault weapons were rarely confiscated: A total of 6 were recovered from juveniles during the 8 years examined. Even if one broadened the classification to include the SKS rifle, a commonly encountered military-style, semiautomatic rifle, the number of assault weapons would only increase by 10, bringing the total to 16.

In stark contrast to the assault weapons, one of the most commonly confiscated firearms is the nonpowder firearm: typically called a BB or pellet gun. Although these firearms are considered to have relatively little capacity for injury, the medical literature has documented some cases of death and serious injury (American Academy of Pediatrics, 1987; Lawrence, 1990; Schein, Enger, & Tielsch, 1994). Of the entire St. Louis sample of firearms, 134, or 12.7%, were nonpowder firearms.

DISCUSSION

Much of our knowledge about juvenile firearms use is a product of sensationalized media accounts and anecdotal information from emergency room physicians and police officers. In addition, the entertainment industry portrays juvenile gunslingers increasingly carrying a range of sophisticated firearms. Fortunately, many of these depictions are inaccurate.

The present study, by contrast, finds that youths are more likely to have pellet guns, .22 caliber firearms, and Saturday night specials confiscated by the police. We also found that although there has been a statistically significant variation in the capacity of lethality of firearms seized from persons legally defined as juveniles in St. Louis, Missouri, from 1992 to 1999, there was no trend indicating that these firearms were becoming more lethal over time. By eliminating firearms classified within Threat Level 6, which are primarily sawed-off shotguns, the mean variance between years became insignificant. Overall, most firearms seized from juveniles by the police have a low threat level.

Contrary to most media accounts, the recovery of assault weapons from youngsters is a relatively rare event. In the 96-month period of this research, only six assault weapons were confiscated. On a more ominous note, youths were likely to possess illegally sawed-off rifles or shotguns. As a vast majority of these sawed-off firearms are shotguns (69 of the 96 sawed-off guns), they have both a high capacity for lethality and they are easily concealed: Many of these firearms had an overall length of less than 16 inches. Stolzenberg and D'Alessio (2000) found that such illegal firearms, represented by the number of stolen weapons in circulation, are likely to influence rates of firearms violence. Therefore, it is possible that the inherently illegal status of sawed-off rifles and shotguns make them more likely to be involved in criminal offenses.

The widespread use of firearms classified as illegal by the NFA in this sample of juveniles may be one unanticipated consequence of reducing firearms availability. Interviews of adult offenders completed by Wright and Rossi (1986) and Knox et al. (1994) indicated that sawed-off rifles and shotguns are widely used by adult offenders. Shortening the barrel or stock of a firearm to increase the ease of concealment appears to be one manner of responding to the lack of handgun availability. One unanticipated drawback of this practice, however, is that these weapons have a high capacity for lethality compared to Saturday night specials. As Di Maio (1985) has observed, "At close range, the shotgun is the most formidable and destructive

of all small arms" (p. 182). In this sample, the percentage of sawed-off firearms recovered remained relatively stable over time; these firearms ranged from 6% to 12% of the number of weapons seized annually, and no trends were evident.

It is important that we not minimize the seriousness of youths' illegally possessing or carrying any firearm. Wounds from pellet guns can cause painful and permanent as well as lethal injuries to victims (American Academy of Pediatrics, 1987; Lawrence, 1990; Schein et al., 1994). Alternatively, despite their diminutive size, the .22 long rifle and similar small calibers can be exceedingly lethal cartridges (Di Maio, 1985; Swistounoff, 1999). As one example of this, of the 599 police officers killed in the United States from 1985 to 1996, 75 were killed by firearms with a caliber of .32 or less (NIJ, 1998).

POLICY IMPLICATIONS

Juveniles and young adults made a significant contribution to increases in American homicide rates throughout the 1980s and 1990s (Cole, 1999; Fingerhut et al., 1998; Suffredini, 1994). Wintemute (2000) for instance, noted that "weapons-related offenses among juveniles (age 17 or less) more than doubled from 1985 to 1993, whereas those among all adults taken together increased a relatively modest 33 percent" (p. 51). Although this study demonstrates that juveniles are likely to possess firearms that are not very sophisticated, any illegally used firearm represents a threat to the police and public safety. Sherman (2001) observed how juvenile gun violence is a product of the gun density in a small number of inner city neighborhoods that are responsible for half of the nation's homicides. Stolzenberg and D'Alessio (2000) found that increases in the numbers of illegally obtained and carried firearms in these neighborhoods are positively associated with violent crime. Therefore, the gun density in a neighborhood may be a less reliable predictor of lethal violence than the types of guns circulating.

A number of innovative programs have attempted to reduce gun density in inner city urban areas, especially when they target high risk offenders or illegally carried weapons. The St. Louis Metropolitan Police Department developed a firearms suppression program where police received parental consent-to-search the homes of high-risk juveniles and confiscate firearms—with no legal consequences for the youths or parents—if a gun was found. While this program eventually was disbanded, it represents one method of reducing gun density for the highest-risk juveniles in the highest-risk neighborhoods (Rosenfeld and Decker, 1996).

Such high-risk youths typically are gang-involved, and gang involvement has been positively associated with increases in the juvenile and young adult homicide rates in the 1980s and 1990s (Howell, 1999). Gangs are more likely to recruit adolescents who own illegal firearms, and gang members are more than twice as likely than non–gang members to own a gun for protection, more likely to have peers who own guns for protection, and more likely to carry their firearms outside the home (Bjerregaard & Lizotte, 1995). In addition, gang involvement has been positively associated with illegal gun carrying in urban adolescents until age 16 and drug trafficking afterwards (Lizotte et al., 2000).

Like many inner-city urban areas, St. Louis has a significant gang problem, and these gangs are responsible for importing firearms into the city (Decker & Van Winkle, 1996). In addition, firearms are commonly exchanged, at a fraction of their retail value, for money or drugs in the routine street activities of crime-involved juveniles and adults in urban areas (Decker & Ruddell, n.d.). Therefore, any successful intervention to reduce the proliferation of firearms in these urban areas must address the twin problems of gang ownership of firearms as well as the use of firearms as a medium of exchange in the street culture.

Two well-documented experiments used uniformed police patrols to reduce the proliferation of illegally carried firearms in high-risk Kansas City, Missouri (Sherman, Shaw, & Rogan, 1995), and Indianapolis, Indiana, neighborhoods (McGarrell, Shermak, & Weiss, 1999). These short-term experiments demonstrated that homicides could be reduced through targeted police interventions. In a nation like the United States, with a gun density of nearly one firearm per person, the confiscation of illegally carried firearms in urban areas can lead to a significant reduction in lethal violence.

Taking a more intermediate and integrated orientation, Boston's Cease Fire Project has been touted as one example of violent crime reduction through cooperative enforcement strategies between prosecutors, and municipal and federal law enforcement agencies concurrent with the implementation of community-based interventions. By using these cooperative law enforcement interventions to reduce violence by chronic gang offenders, youth homicide was reduced significantly (Kennedy, 1997). It is important to note, though, that juvenile violence, particularly homicide, was dropping throughout the country during the era when these programs were introduced. Related to this, Table 2 demonstrates that St. Louis homicides and aggravated assaults with firearms followed these national trends.

A number of other jurisdictions have used similar problem-solving approaches to reduce youth firearms use. Lizotte and Sheppard (2001), for instance, examined a number of gun violence prevention programs. A com-

mon theme in these successful firearms suppression programs was their reliance on multiple strategies most often directed at high-risk residential areas and high-risk populations such as gang members. Law enforcement strategies were supported by community-based initiatives that offered positive opportunities, such as academic, vocational, or after-school programs. In addition, public information campaigns and mobilization of community leaders in these high-risk residential areas sought to enhance resiliency in these neighborhoods (Lizotte & Sheppard, 2001).

Despite the relative success of these different types of firearms intervention initiatives, however, perhaps long-term changes in public perceptions will be the most successful method of reducing firearms crimes over time. Sherman (2001) has argued that public attitudes toward illegally carrying concealed weapons need to change. He has advocated using sentencing policies as a starting point for changing public perceptions about the seriousness of firearms offenses. Through stricter punishments for offenders, we may be able to reduce illegally carried firearms in a manner similar to the way driving while intoxicated was discouraged throughout the 1980s and 1990s. Certainly, increasing awareness about school shootings has resulted in a number of youngsters contacting the police when their peers are planning such acts of violence. Despite the intuitive appeal of these changes in culture and attitude, however, youths who carry firearms because they fear lethal violence may be resistant to abandoning their weapons, fearing their peers or gangs more than fearing legal sanctions.

One of the clearest points of possible intervention is a school-based program aimed at problem solving and conflict resolution. Already, programs such as DARE and GREAT offer curriculum components designed to address the issue of conflict (see, for example, Winfree, Peterson-Lynskey, & Maupin, 1999). These programs could be expanded to deal explicitly with the carrying and use of firearms by juveniles.

Confronting the issue of safe schools involves a cluster of social problems such as drugs, gangs, and firearms (Loeber, Kalb, & Huizinga, 2001; Wasserman, Miller, & Cothern, 2000). However, as Pollack and Sundermann (2001) noted,

> School safety is not about one method of control: metal detectors, surveillance systems, or swift punishment. Nor is it about any single risk factor such as dysfunctional homes and inadequate schools. We have learned that we cannot identify with certainty those students who, for reasons clear only to themselves, will assault their teachers and peers. We now understand that safe schools require broad-based efforts on the part of the entire community, including educators, students, parents, law enforcement agencies, businesses, and faith-based organizations. (p. 13)

Although this quote is especially insightful in regards to school-based violence (including firearms use), two very important points remain. First, as Pollack and Sundermann (2001, p. 20) concluded, even the most thorough planning for safe schools will not eliminate all acts of violence on school property. Second, and perhaps even more critical for educators and law enforcement agencies, not all of the youngsters charged with weapons violations are in schools where they can be exposed to violence prevention education: Some schools do not offer such courses, some of these youngsters have graduated, but unfortunately, a number have dropped out or have been expelled. Therefore, other interventions will be necessary.

It has been suggested that there are technological solutions to the problem of illegally carried firearms in high-risk neighborhoods. Wilson (1998) has advocated the use of portable scanning devices similar to radar units that the police could use unobtrusively to identify whether illegally concealed firearms are being carried. The NIJ has supported research and development of these types of technological interventions that could reduce illegally carried weapons or contraband. Although there are many technological and perhaps legal barriers to implementing such innovations (Paulter, 2001), such technologies offer one potential long-term solution to illegally carried firearms. Although such approaches have clear civil-liberties implications, an added benefit of these unobtrusive measures is that they reduce the chance of negative citizen-police confrontations inherent in "stop and frisk" programs.

CONCLUSIONS

The development of harm-reduction strategies to reduce youth gun possession, consideration of further legislation, and the development of police tactics and training should be driven by research, not rhetoric. When considering such strategies, we have to understand the factors that motivate youngsters to possess or use a Saturday night special, pellet gun, or sawed-off rifle or shotgun. Youths who carry firearms as a status symbol or to impress their friends (Keene, 1997) more than likely have different motivations than youths who carry firearms for protection from real or perceived threats (Lizotte et al., 2000; Lizotte, Howard, Krohn, & Thornberry, 1997; May, 1999). Accordingly, future studies of juvenile firearms use should explore the motivations for use.

Clearly, further research is needed to determine how adolescents choose the weapons they possess and whether their decisions are motivated by price, availability, style, or size (Kennedy et al., 1996), the status it can offer a young person (Birkbeck et al, 1999; Keene, 1997), or whether the firearm is

new and cannot be linked to any crime. In addition, there are very little data that address the type of cartridges that offenders are likely to use. For instance, do juveniles use the cheapest and typically least lethal cartridges or more expensive and lethal bullets? Such research might also inform selection and use of body armor, police tactics, legislation, and emergency room practices. Scholars who study trends in firearms use suggest that expensive semiautomatic handguns that chamber larger cartridges are becoming more widely manufactured and distributed (Watchel, 1998; Wintemute, 2000). These firearms commonly are depicted in movies and television programs, and they may be very desirable to youths as well. Regardless of their popularity, however, this study finds that these types of weapons were no more likely to be confiscated by the police in 1999 than they were in 1992, at least in St. Louis, Missouri.

APPENDIX

Correlation Between the National Institute of Justice (NIJ) Threat-Level Scale, Marshall and Sanow Stopping Power Data (M&S), and Muzzle Energy (ME) of Firearms Seized From St. Louis Juveniles, 1992-1999

	All 1,055 Firearms			*821 Handguns*		
	NIJ	*M&S*	*ME*	*NIJ*	*M&S*	*ME*
Modified NIJ threat level	1.00	.860*	.848*	1.00	.903*	.863*
M&S	.860*	1.00	.651*	.903*	1.00	.854*
ME	.848*	.651*	1.00	.863*	.854*	1.00

SOURCE: M&S data from Dale Towert's Stopping Power Web page: http://www.evanmarshall/daletowert/stoppingpower.htm; ME data from Ballistics Data, http: web4.integraonline.com/~bbroadside/Ballistic_Info.html.

NOTE: Because nonpowder firearms were not included in M&S, the stopping power of a pellet firearm was reported as 1/2 the stopping power of a .22 rimfire. Stopping power of the .38 Special was averaged for 2- and 4-inch barrels. All figures represent the greatest stopping power ammunition for the caliber. Because nonpowder firearms were not included in ME, the muzzle energy of a 10-grain pellet at a velocity of 1,000 feet per second was used.

*$p < .01$.

NOTES

1. Although body armor can withstand penetration of a projectile, there is still a risk of serious injury or mortality due to blunt trauma injury. The National Institute of Justice (NIJ) threat rating has been criticized as having overly conservative classifications. See Jason and Fackler's (1991) analysis of body armor standards.

2. Placing the .45 Automatic Colt Pistol (ACP) in a higher classification had no measurable impact on the findings as these firearms were rarely confiscated from juveniles.

3. For researchers interested in comparing the modified NIJ scale, Marshall and Sanow's (1996) Stopping Power data, and Muzzle Energy data used in this sample, these data are available from the first author.

4. Examination of the yearly means was completed using an ANOVA analysis, and we found a statistically significant variation between the annual threat level means (p = .031). When nonpowder firearms were removed from the analysis, the variance remained statistically significant (p = .009), but this variance became insignificant once Threat Level 6 firearms were removed.

5. As there was no measure of value of the firearm in the data, Saturday night specials are coded on the basis of barrel length and caliber: Classical definitions of Saturday night specials have usually included a dollar value. Recent classifications have also included melting point of the frame—a reflection of the cheaper materials used in some of these firearms.

6. Wintemute (2000) has identified a number of inexpensive firearms made by six manufacturers in Southern California as "Ring of Fire" guns and suggested that these firearms are disproportionately involved in violent crime. An examination of this sample found that of the 735 cartridge handguns recovered, 99 were made by these firms. There was no clear change in the recovery of these firearms over the 8-year period of this study, ranging from 4.4% to 15.3% of the sample.

7. The 19 firearms banned from further importation include the AK-47 and its variants, the UZI and Galil, Beretta AR-70, Colt AR-15, FN/FAL, FN/LAR and FNC, the SWD M-10, M-11, M-11/0 and M-12, Steyr AUG, TEC-9, TEC-DC9 and TEC 22, and the Street Sweeper and Striker 12 shotguns. Of the 6 assault weapons confiscated by St. Louis police, all were TEC-9 or TEC-22 firearms.

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