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Original article

Race and ethnicity, neighborhood poverty and pediatric firearm hospitalizations in the United States

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ABSTRACT

Purpose: To better understand the effects of race and/or ethnicity and neighborhood poverty on pediatric firearm injuries in the United States, we compared overall and intent-specific firearm hospitalizations (FH) with those of pedestrian motor vehicle crash hospitalizations (PMVH).
Methods: We used Nationwide Inpatient Sample data (1998–2011) among 0–15 year-olds in a 1:1 case-case study; 4725 FH and 4725 PMVH matched by age, year, and region.
Results: Risk of FH versus PMVH was 64% higher among black children, Odds ratio (OR) = 1.64, 95% confidence interval (95% CI) = 1.44–1.87, as compared to white children ($P < .0001$); this risk did not vary by neighborhood poverty (P interaction = .52). Risk of homicide FH versus PMVH was 842% higher among black (OR = 8.42, 95% CI = 6.27–11.3), 452% higher among Hispanics (OR = 4.52, 95% CI = 3.33–6.13) and 233% higher among other race (OR = 2.33, 95% CI = 1.52–3.59) compared to white children. There was a lower risk for unintentional FH among black OR = 0.73, 95% CI = 0.62–0.87, Hispanics (OR = 0.60, 95% CI = 0.49–0.74), and other (OR = 0.63, 95% CI = 0.47–0.83) compared to whites. These intent-specific risks attributed to race did not vary by neighborhood affluence.
Conclusions: Black children were at greater likelihood of FH compared to white children regardless of neighborhood economic status. Minority children had an increased likelihood of intentional FH and a decreased likelihood of unintentional FH as compared to white children irrespective of neighborhood income.

Firearm injuries are one of the three major causes of death in children [1]. Importantly, for every pediatric firearm fatality, there are seven to eight nonfatal firearm injuries [2]. Although nonfatal firearm injury rates declined slightly from 8.25 per 100,000 in 2001 to 7.35 in 2011 [2], a recent study reported that on average, 20 pediatric firearm hospitalizations (FH) occur every day among those younger than 20 years of age in the United States [3]. FH are associated with high hospitalization costs, severe injuries, and persisting disabilities [4–6].

Racial and/or ethnic and income differences in the occurrence of injury-related hospitalization have been well established [7–10]. In particular, there are racial and/or ethnic differences in pediatric firearm injuries, with 50% of emergency room firearm-related visits being among black children [9]. Injury-related hospitalizations and fatality are also associated with residence in low-income neighborhoods [10]. The risk of all-cause injury and assault injuries is more likely in children from low-income households [10,11].

Parallels have been drawn between firearm injuries and motor vehicle accidents (MVAs) in the context of gun control. MVAs have been drastically reduced because of effective legislative and public health approach [12], whereas gun violence prevention is also

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amenable to reduction by application of the same methods [13]. Of particular importance is that, younger age groups were found to be more likely to retain pedestrian MVA injuries, whereas older age groups were liable to firearm, assault, and occupant MVA injuries [14]. Among all MVA injuries, pedestrian injuries are more severe than occupant injuries and significantly more injured pedestrians occurred at intersections in poor areas [15].

However, to our knowledge, there have been no studies that have explored whether the increased risk of FH among minorities varies by neighborhood income. Simply put, is the increase in risk of FH among minority children only present in low-income neighborhoods? In this analysis, we compared FH to pedestrian motor vehicle crash related hospitalizations (PMVH), informed by previous reports [16] that draw parallels between efforts that have successfully reduced motor vehicle related injury in the United States over the past decades and potential efforts that could successfully influence firearm injury.

Methods

Data

Data were derived from the Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), a longitudinal database by the Agency for Healthcare Research and Quality [17]. The NIS is a 20% stratified sample of U.S. hospitals from state hospitalizations, which draws from over 1000 hospitals in 46 states, capturing approximately 8 million acute hospital stays each year. Firearm and pedestrian motor vehicle crash related injury hospitalizations were derived from secondary diagnostic *International Classification of Diseases, ninth edition* (ICD-9) codes as described in Supplementary Appendix 1. Having one of 32 diagnostic ICD-9 codes in Supplementary Appendix 1 was classified as PMVH. Intent of FH was categorized into suicide, homicide, unintentional, undetermined, and legal using ICD-9 E-codes. We used NIS data sets from 1998 to 2011 to compare FH and PMVH. The data sets were first restricted to all hospitalizations between the age of 0–15 years because of distinct firearm injury differences between children and adolescents [18], followed by exclusion of all neonatal hospitalizations (defined by primary diagnostic ICD-9 code in Supplementary Appendix 2), resulting in a total of 83,129,094 survey-weighted hospitalization records (unweighted = 16,998,470). For comparison of FH versus PMVH, we further restricted the data to include only FH (survey weighted, $n = 23{,}259$, unweighted, $n = 4725$) and PMVH (survey weighted, $n = 115{,}737$, unweighted, $n = 23{,}387$).

Study design

To determine the impact of race and ethnicity, we used a 1:1 matched case-case design; matched for survey year, age categories (0–5, 6–10, and 11–15 years), and U.S. census regions. Case control studies is a common study design in epidemiology used to determine the strength, magnitude, and direction of associations between exposure variables and an outcome of interest, whereas a variant, case-case design is used when the condition of interest can be a comparison of several groups that may have distinct risk factors and obtained from the same surveillance system [19]. Here, the common surveillance system is the injury-related inpatient hospitalization data, where the common group is injury and the subgroups that are compared are FH and PMVH. Therefore, the main advantage of the case-case design in this case is to limit selection, and information biases as the control cases have similar clinical features and are identified through the same system and is subject to the same biases as cases [19,20]. Cases could not be matched based on hospitals which were primary stratification units (PSUs) because the sample sizes within each PSU will be insufficient to yield standard errors. U.S. census regions (geographical unit of U.S. census region was states) were used as broader approximations for PSUs. The cases were pediatric FH, and control cases were PMVH matched in a 1:1 ratio. We used survey year, age, and U.S. census regions as variables to be matched for depending on the significant differences in these variables between the two groups, FH versus PMVH.

Variables

The main exposure of interest was race and ethnicity for the case-case study between FH versus PMVH. Race and/or ethnicity was categorized into white, black, Hispanic, and other (pooled from Asian or Pacific Islander, Native American, other races). NIS provides a quartile classification of the estimated median household income of residents in the patient's ZIP code. The quartiles are identified by values of 1 to 4, indicating the poorest to wealthiest populations. The lowest income quartile ranges from $1 to $28,999 in 1998 to $1 to $38,999 in 2011. Neighborhood economic status was categorized as high versus low income based on the median zip code income of the hospitalized patient. The neighborhood was categorized as low income if the hospitalized patient was living in a neighborhood with median income ≤$25,000 during survey years 1998 to 2002, or if the median household income of the neighborhood belonged to the lowest national quartile for survey years 2003 to 2011. The other patient level covariates used in the analysis were gender (male, female), primary payer (private, Medicaid/other), and U.S. census regions (Northeast, Midwest, South, West).

Statistical analysis

Rates per 100,000 pediatric hospitalizations for FH and PMVH from 1998 to 2011 were assessed using survey-weighted proportions separately for each survey year. Analysis of matched case-case study was performed using unweighted conditional logistic regression to calculate odds ratios (ORs) and 95% confidence intervals (CIs). FH was compared against PMVH to assess the impact of race and/or ethnicity and other individual level covariates without survey weights to account for matched analysis. Although the strength of the association (OR) assesses the association between race/ethnicity and FH, it is important to interpret this association in comparison with PMVH. We obtained an adjusted estimate of risk of race and/or ethnicity by adjusting for covariates that significantly improved the likelihood of the model. Effect modification by neighborhood income status was assessed, and the difference in effect was assessed using appropriate interaction tests. Survey-adjusted analysis could not be performed due to low sample sizes (resulting in nonestimable standard errors) within primary sampling units for estimation of conditional ORs and stratified analysis. All analyses were performed using STATA, 13.1 (StataCorp LP; College Station, TX).

Results

During 14 years, from 1998 to 2011, of the 16,998,470 unweighted counts of hospitalizations among 0 to 15 year old, 4725 were FH (0.03%), and 23,387 were PMVH (0.14%). Both FH and PMVH rates significantly declined from 1998 to 2011 (Supplemental Table 1). Among all pediatric FH, 1834 (38.9%) were assault FH, 2443 (51.7%) were unintentional and/or accidental, 145 (3.1%) were suicide FH, 282 (6.0%) were of undetermined intent and 19 (0.4%) were legal FH. After 1:1 matching by age, year, and U.S. census region, 9.8% were between 0 and 5 years, 15.9% were between 6 and 10 years, and 74.3% were 11–15 years. The percentages among survey years ranged from 4.4% in 2011 to 10.7% in 1998. Most of them were from south census region (39%), followed by west (24.0%), Midwest (23.1%) and lowest in the northeast (13.3%).

Table 1 presents the baseline characteristics after 1:1 matching. All 4725 FH were matched. FH were less likely to be girls (conditional logistic regression [COR] = 0.48; 95% CI = 0.43–0.53), more than twice as likely to be from low-income neighborhoods (COR = 1.65, 95% CI = 1.50–1.83) and have Medicaid (COR = 1.88, 95% CI = 1.71–2.08). Race/ethnicity was a significant risk factor for firearm injury in both crude and adjusted analysis. Hospitalization due to firearm injury was 77% more likely among black children (adjusted COR = 1.77, 95% CI = 1.55–2.02) and 21% more likely among Hispanic children (adjusted COR = 1.21, 95% CI = 1.04–1.41) as compared to whites ($P < .0001$). FH rates were highest among those with the lowest income (Supplementary Table 2), whereas half of all hospitalizations among blacks and only 18% among whites had the lowest income (Supplementary Table 3). Figure 1 presents the differential effect by low-income and high-income neighborhoods on the association between race/ethnicity and FH. We found that minority race was a significant risk factor in both high and low income neighborhoods; even after adjusting for covariates, there was no significant difference by neighborhood income (P interaction = .52).

Table 2 compares the risk of FH by race and/or ethnicity within intent categories with that of the control population. After adjusting for covariates, risk of homicide FH was eight times greater among black children (COR = 8.42, 95% CI = 6.27–11.3), five times in Hispanics (COR = 4.52, 95% CI = 3.33–6.13) and more than two times in other race (COR = 2.33, 95% CI = 1.52–3.59) and four times in unknown race (COR = 3.88, 95% CI = 2.88–5.24) as compared to white children ($P < .0001$). By contrast, risk of unintentional FH was 27% less likely in black children (COR = 0.73, 95% CI = 0.62–0.87), 40% less likely in Hispanic (COR = 0.60, 95% CI = 0.49–0.74), and other race children (COR = 0.63, 95% CI = 0.47–0.83) as compared to whites ($P < .0001$). On the contrary, risk of suicide FH was not significantly reduced among any minority races as compared to white children ($P = .15$), whereas the risk of undetermined FH was four times among black children (COR = 3.70, 95% CI = 2.08–6.56), twice as likely among other race (COR = 2.44, 95% CI = 1.05–5.68; $P = .0001$) and among Hispanics (COR = 1.72, 95% CI = 0.84–3.52) as compared to whites.

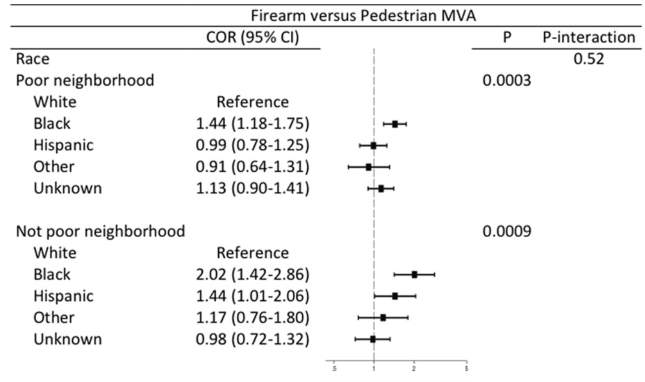

Fig. 1. Effect of neighborhood affluence on the impact of race and ethnicity on the risk of firearm compared to pedestrian motor vehicle injury hospitalizations, NIS 1998–2011. P interaction denotes P value for interaction. Matched pair analysis was performed using unweighted conditional logistic regression and adjusted for gender, insurance type and U.S. census regions. Odds ratio are represented as solid squares and 95% confidence intervals are represented as sidebars. P interaction was calculated for interaction by neighborhood affluence using χ^2 test.

The differential by neighborhood income in the risk of intent-specific FH due to race/ethnicity is presented in Figure 2. Although the risk of assault FH was the greatest among black children, the risk was not different according to neighborhood economic status: poor (COR = 9.31, 95% CI = 5.72–15.1) and not poor (COR = 8.91, 95% CI = 3.95–20.1, P interaction = .96). Reduced likelihood of unintentional FH among black (COR = 0.63, 95% CI = 0.48–0.81) and Hispanic (COR = 0.53, 95% CI = 0.39–0.73) as compared to white children was significant in poor neighborhoods but was not significantly different between poor and not poor neighborhoods (P interaction = .56). There was no significant difference according to neighborhood affluence in the risk of suicide FH (P interaction = .13) and undetermined FH (P interaction = .54) due to race and/or ethnicity.

Table 1
Association between baseline characteristics of firearm and pedestrian motor vehicle injury hospitalizations, NIS 1998–2011

Baseline Characteristics	Firearm, *n* (%)	Pedestrian MVA, *n* (%)	Unadjusted COR (95% CI)[a]	P^a	Adjusted COR (95% CI)[b]	P^b
Unweighted total, *n*	4725	4725				
Race				<.0001		<.0001
White	1178 (24.9)	1623 (34.3)	Reference		Reference	
Black	1377 (29.1)	931 (19.7)	2.06 (1.84–2.32)		1.64 (1.44–1.87)	
Hispanic	799 (16.9)	754 (16.0)	1.43 (1.26–1.63)		1.14 (0.98–1.32)	
Other	226 (4.8)	306 (6.5)	1.01 (0.83–1.22)		0.89 (0.72–1.10)	
Unknown	1145 (24.2)	1111 (23.5)	1.41 (1.25–1.59)		1.22 (1.06–1.39)	
Gender				<.0001		<.0001
Male	3832 (81.1)	3265 (69.0)	Reference		Reference	
Female	840 (17.8)	1434 (30.4)	0.49 (0.45–0.54)		0.48 (0.43–0.53)	
Unknown	53	26				
Insurance				<.0001		<.0001
Private	1659 (35.1)	2542 (53.8)	Reference		Reference	
Medicaid/other	3041 (64.4)	2160 (45.7)	2.23 (2.04–2.44)		1.88 (1.71–2.08)	
Unknown, *n*	25	23				
Neighborhood				<.0001		<.0001
Not poor	1469 (31.1)	2147 (45.4)	Reference		Reference	
Poor	3140 (66.5)	2475 (52.4)	1.97 (1.80–2.16)		1.65 (1.50–1.83)	
Unknown, *n*	116	103				

Matched for age, survey year and U.S. census region.
Matched pair analysis was performed using unweighted conditional logistic regression.
[a] Matched for age, survey year and US census region.
[b] Matched pair analysis was performed using un-weighted conditional logistic regression.

Table 2
Race/ethnicity as a risk factor of firearm and pedestrian motor vehicle injury hospitalizations by intent, NIS 1998–2011

Characteristics	Homicide	*P*	Unintentional	*P*	Suicide	*P*	Undetermined	P	Legal	P
N	1836		2443		145		282		19	
	COR (95% CI)		COR (95% CI)		COR (95% CI)		COR (95% CI)		COR (95% CI)	
Unadjusted										
Race		<.0001		.0001		.13		<.0001		ne
White	Reference		Reference		Reference		Reference		Reference	
Black	11.9 (9.11–15.4)		0.82 (0.70–0.96)		0.49 (0.24–0.99)		3.98 (2.38–6.66)		ne	
Hispanic	5.93 (4.54–7.74)		0.71 (0.59–0.85)		0.70 (0.34–1.44)		1.63 (0.86–3.11)		ne	
Other	2.96 (2.05–4.29)		0.65 (0.50–0.85)		0.39 (0.11–1.36)		2.53 (1.16–5.53)		ne	
Unknown	4.89 (3.75–6.37)		0.92 (0.79–1.08)		0.59 (0.33–1.04)		1.47 (0.89–2.43)		ne	
Adjusted										
Race		<.0001		<.0001		.15		.0001		ne
White	Reference		Reference		Reference		Reference		Reference	
Black	8.42 (6.27–11.3)		0.73 (0.62–0.87)		0.56 (0.27–1.18)		3.70 (2.08–6.56)		ne	
Hispanic	4.52 (3.33–6.13)		0.60 (0.49–0.74)		0.60 (0.27–1.33)		1.72 (0.84–3.52)		ne	
Other	2.33 (1.52–3.59)		0.63 (0.47–0.83)		0.40 (0.09–1.74)		2.44 (1.05–5.68)		ne	
Unknown	3.88 (2.88–5.24)		0.84 (0.71–1.00)		0.66 (0.36–1.22)		1.24 (0.71–2.16)		ne	

COR, conditional logistic regression; CI, confidence interval; Ne, not estimable.
Case control analysis was performed using unweighted COR. Adjusted COR was adjusted for gender, type of insurance, and neighborhood income.

Discussion

Using nationally representative hospitalization data from 1998 to 2011, we found that black children were at substantially greater risk of FH compared to PMVH. Importantly, this greater risk of FH among black children was independent of whether they lived in high-income or low-income neighborhoods. We also found that all minority race children (black, Hispanic, and other race) as compared to white children were at a greater likelihood of homicide FH than of PMVH, conversely all minority race children were significantly less likely to be hospitalized for unintentional firearm than pedestrian injuries versus PMVH in comparison to white children. This minority race disadvantage was also found to be similar among high-income and low-income neighborhoods.

We showed that the high risk of pediatric hospitalizations for firearm injuries compared to other injury hospitalization among black children; this observation is congruent with earlier reports on firearm injuries using national firearm fatality and injuries data [3,21]. Data from emergency department visits between 1993 and 2000 demonstrated an increased risk of both fatal and nonfatal firearm injuries among black children [22]. The observed increased likelihood of FH among blacks than whites was in parallel to the results of a previous study, where a much higher rate of FH among blacks was found as compared to whites [21]. In an analysis of pediatric firearm deaths using National Trauma Data Bank from 2007 to 2008, blacks accounted for 49.7% of firearm deaths [9].

Importantly, we observed no difference by neighborhood income status in the increased likelihood of FH among minority children compared to white children. In some ways, this is consistent with prior studies that have shown persistent racial and/or ethnic differences in child health indicators in both high and low income neighborhoods throughout the United States [23,24]. This finding suggests deep and intractable racial and/or ethnic differences in FH in the United States, obviating the typically observed health benefits of living in higher income neighborhoods.

We demonstrated that minority children had a greater risk for intentional and/or homicide FH compared to white children; this is congruent with other studies [25]. Our observation that minority children as compared to white children were less likely to be hospitalized for unintentional FH than PMVH is comparable to the results from a level 1 trauma center study that indicated that black gunshot patients were victims of assault, whereas nonblack patients suffered unintentional injuries [26]. Taken together, these findings suggest substantial differences in the experiences of minority children compared to white children throughout the United States, and that the higher exposure of minority children to guns and homicide-firearm violence in comparison to PMVH exists in both high-income and low-income neighborhoods. The relative, increased risk among white children of unintentional and/or suicide FH versus PMVH compared to minority children as a reciprocal observation may suggest a different operational dynamics that characterize the lives of minority race children compared to white children in the United States.

Several limitations of our analysis are worth the discussion. The first and the most important limitation of our study is that 25% of all hospitalizations are missing information on race. However, we have no reason to believe that missing race data are not random across the study population, suggesting that our results are, if anything, conservative in our documentation of racial differences in the health indicators of interest here. The second limitation is the absence of individual gun ownership characteristics and other relevant unmeasured confounders in the NIS data, which constraints our ability to appropriately determine the risk estimates adjusted for these measures. Future studies using data sets with comprehensive sociodemographic information will allow for a complete analysis. Third, NIS data do not provide patient-level data and are unable to distinguish between index hospitalizations and rehospitalizations. We are unable to take into account the correlation between individuals who are being rehospitalized due to absence of data linkage at patient level. However, this may be equally likely between FH and PMVH and may not result in the overestimation of relative risk. Fourth, categories of neighborhood income are confined to quartiles of national income. Income levels and attributed affluence differ in different areas and may not be comparable across the country. The neighborhood income quartile we used serves as a surrogate for median income of the participants' neighborhood within the constraints of the available data. Our statistical models are matched for the U.S. census regions that provide estimates that may partially address the state-specific differences. We did not assume clustering within U.S. census regions to avoid over correction, as hospitalizations will be clustered within hospitals and the wide variations in FH and PMVH between the states. Fifth, pediatric hospitalizations may not be representative of the general pediatric population. However, the temporal patterns of FH we report are comparable to the national temporal patterns in

Intent		COR (95% CI)	P	P-interaction
Assault/homicide	Poor neighborhood		<0.0001	0.96
	White	Reference		
	Black	9.31 (5.72-15.1)		
	Hispanic	4.44 (2.69-7.31)		
	Other	2.26 (1.05-4.86)		
	Unknown	4.43 (2.67-7.33)		
	Not poor neighborhood		<0.0001	
	White	Reference		
	Black	8.91 (3.95-20.1)		
	Hispanic	5.19 (2.41-11.2)		
	Other	3.80 (1.55-9.30)		
	Unknown	1.97 (0.96-4.02)		
Unintentional	Poor neighborhood		0.0002	0.56
	White	Reference		
	Black	0.63 (0.48-0.81)		
	Hispanic	0.53 (0.39-0.73)		
	Other	0.66 (0.41-1.06)		
	Unknown	0.72 (0.54-0.98)		
	Not poor neighborhood		0.60	
	White	Reference		
	Black	1.06 (0.67-1.68)		
	Hispanic	0.85 (0.52-1.41)		
	Other	0.72 (0.41-1.25)		
	Unknown	0.80 (0.55-1.16)		
Suicide	Poor neighborhood		0.53	0.13
	White	Reference		
	Black	0.42 (0.12-1.41)		
	Hispanic	1.03 (0.19-5.64)		
	Other	1.06 (0.04-30.4)		
	Unknown	1.03 (0.34-3.12)		
	Not poor neighborhood		0.50	
	White	Reference		
	Black	2.13 (0.36-12.5)		
	Hispanic	0.38 (0.06-2.26)		
	Other	0.62 (0.03-12.2)		
	Unknown	0.34 (0.07-1.70)		
Undetermined	Poor neighborhood		0.062	0.54
	White	Reference		
	Black	2.69 (1.17-6.17)		
	Hispanic	0.86 (0.23-3.29)		
	Other	2.44 (0.60-9.89)		
	Unknown	1.00 (0.42-2.36)		
	Not poor neighborhood		0.23	
	White	Reference		
	Black	4.94 (0.99-24.4)		
	Hispanic	2.31 (0.52-10.3)		
	Other	4.72 (0.59-37.8)		
	Unknown	1.91 (0.49-7.53)		

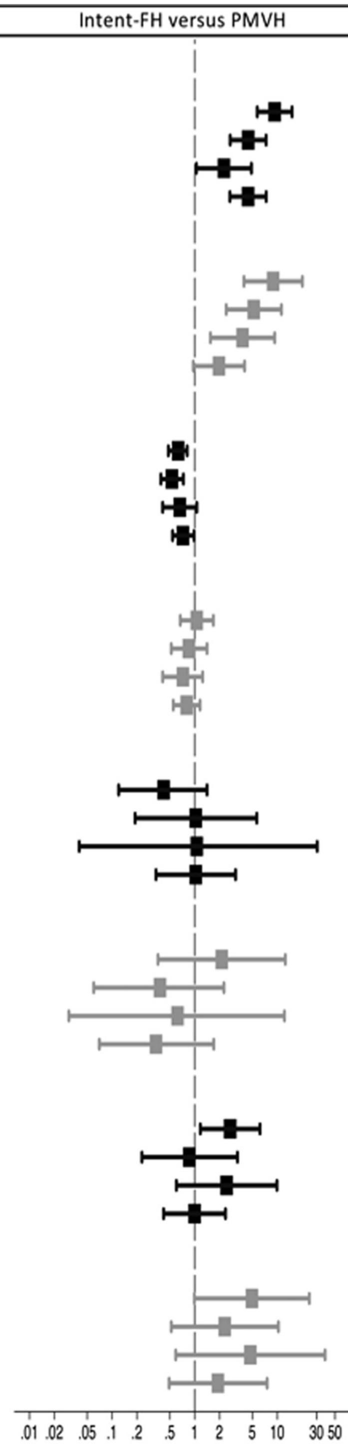

Fig. 2. Effect of neighborhood affluence on the impact of race and ethnicity on the risk of various intents of FH compared to PMVH, NIS 1998–2011. COR denotes conditional logistic regression, CI denotes confidence interval, *P* interaction denotes *P* value for interaction. Matched pair analysis was performed using unweighted conditional logistic regression and adjusted for gender, insurance type, and U.S. census regions. ORs are represented as solid squares, and 95% CIs are represented as sidebars. *P* interaction was calculated for interaction by neighborhood affluence using χ^2 test. Race/ethnicity, neighborhood poverty, and pediatric firearm hospitalizations in the United States.

nonfatal firearm injuries [2], suggesting that FH may be used as an alternative to adequately assess the risk factors of nonfatal firearm injuries in pediatric population.

To our knowledge, this is the first study to assess the differential by neighborhood income, on the relationship between race and/or ethnicity and firearm hospitalization among pediatric population. We found that the increased likelihood of FH over pedestrian injury hospitalizations among minority race children was consistently present across low-income and high-income neighborhoods equally. These results add to the evidence suggestive of deep and structural racial differences in the exposure to firearm violence in the United States.

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Contributor's statements: B.K. and S.G. conceptualized and designed the study, performed the analysis, drafted the initial manuscript, and approved the final manuscript as submitted. M.D.V., M.A.V., E.B., S.V. coordinated the data analysis, drafted the initial manuscript, performed literature search, critically reviewed the manuscript, and approved the final manuscript as submitted. C.J.D., S.S. and J.A.F. designed the study, reviewed and revised the article, and approved the final manuscript as submitted. All authors approved the final manuscript as submitted and agreed to be accountable for all aspects of the work.

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Supplementary Table 1
Trends in firearm-related and pedestrian motor vehicle accident related hospitalizations among children (0–15 years) in the United States, NIS 1998–2011

Type of hospitalization	Age-adjusted firearm deaths per 100,000 population																	
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total	Change	SMD	*P* trend
Total, *N*	5,588,274	5,982,394	5,891,486	5,883,189	5,998,847	6,024,101	6,181,096	6,487,946	6,115,901	6,272,363	5,876,071	5,823,869	5,738,420	5,265,137	83,129,094			
Firearm	2624 (46.96)	2037 (34.05)	1655 (28.09)	1379 (23.44)	1743 (29.06)	1683 (27.94)	1624 (26.27)	1819 (28.03)	1890 (30.90)	1502 (23.95)	1357 (23.09)	1195 (20.52)	1740 (30.32)	1003 (19.05)	23,259 (27.97)	−1.07	−0.80	.011
Pedestrian MVA	11,082 (198.29)	13,053 (218.17)	9272 (157.38)	9251 (157.24)	9716 (161.96)	10,297 (170.91)	9082 (146.92)	8241 (127.02)	7117 (116.35)	6106 (97.35)	5411 (92.07)	6137 (105.36)	6978 (121.60)	3993 (75.85)	115,737 (139.22)	−8.98	−2.05	<.0001

All values are rates per 100,000 hospitalizations. Overall are survey-weighted counts (rates per 100,000 hospitalizations). Change denotes annual change in rate per 100,000. Negative value indicates decline in firearm death rates per 100,000 from 2000 to 2010, and positive value indicates increase in firearm death rate per 100,000 from 1998 to 2011. CIs denote confidence intervals of the annual change in firearm death rate per 100,000. *P* trend calculated using metaregression indicates the significance of the decline or the increase in firearm-related death rates from 1998 to 2011. Total denotes total weighted number of hospitalizations.

Supplementary Appendix 1
ICD-9 diagnostic codes used for categorizing firearm and pedestrian motor vehicle injuries

Firearm injury	
Accident	E9220, E9221, E9222, E9223, E9224, E9228, E9229
Assault	E9650, E9651, E9652, E9653, E9654
Suicide	E9550, E9551, E9552, E9553, E9554, E9556, E9559
Legal	E970
War	E991
Undetermined	E9850, E9851, E9852, E9853, E9854, E9856
Motor vehicle injuries	
Pedestrian	E8106, E8107, E8116, E8117, E8126, E8127, E8136, E8137, E8146, E8147, E8156, E8157, E8166, E8167, E8176, E8177, E8186, E8187, E8196, E8197, E8206, E8207, E8216, E8217, E8226, E8227, E8236, E8237, E8246, E8247, E8256, E8257

Supplementary Appendix 2
Primary diagnostic ICD-9 codes used for excluding neonatal hospitalizations

27701	7708	7709
74783	77081	771
76077	77082	7712
76078	77083	7713
7620	77084	7714
7621	77085	7715
7623	77086	7716
7624	77087	7717
7625	77088	7718
7706	77089	77181
		77182
		77183
		77189

Supplementary Table 2
Distribution of firearm-related hospitalizations among children (0–15 years) and the neighborhood income in the United States, NIS 1998–2011

Neighborhood income	Overall, *n* (%)	Homicide, *n* (%)	Unintentional, *n* (%)	Suicide, *n* (%)	Undetermined, *n* (%)	Legal, *n* (%)
$1–$24,999	1736 (37.7)	834 (46.8)	746 (31.2)	33 (23.8)	116 (41.7)	7 (43.7)
$25,000–$34,999	1404 (30.5)	512 (28.7)	767 (32.0)	46 (33.1)	77 (27.7)	2 (12.5)
$35,000–$44,999	940 (20.4)	305 (17.1)	544 (22.7)	31 (22.3)	55 (19.8)	5 (31.3)
$45,000+	529 (11.5)	131 (7.4)	337 (14.1)	29 (20.9)	30 (10.8)	2 (12.5)

Supplementary Table 3
Distribution of pediatric hospitalizations among race and/or ethnicity and neighborhood income, NIS 1998–2011

Neighborhood income	White, *n* (%)	Black, *n* (%)	Hispanic, *n* (%)	Other, *n* (%)	Unknown, *n* (%)
$1–$24,999	495 (18.1)	1117 (49.4)	606 (40.0)	147 (28.8)	605 (27.4)
$25,000–$34,999	833 (30.5)	602 (26.6)	397 (26.2)	125 (24.5)	688 (31.2)
$35,000–$44,999	728 (26.6)	387 (17.1)	323 (21.3)	119 (23.3)	508 (23.0)
$45,000+	678 (24.8)	156 (6.9)	189 (12.5)	120 (23.5)	408 (18.5)