

# Behavioral Risk Factors and Unintentional Injuries Among U.S. Immigrant Adults

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**PURPOSE:** This study compared 10 risk-taking behaviors generally considered to be risk factors for injuries and unintentional nonfatal injuries between immigrant and U.S.-born adults.

**METHODS:** Data from the 2001 to 2002 National Epidemiologic Survey on Alcohol and Related Conditions were analyzed. The prevalence of unintentional injuries that occurred in the past 12 months was calculated for foreign-born and U.S.-born respondents by major sociodemographic characteristics. The proportion of respondents who were involved in risk-taking behaviors was compared between immigrants and U.S.-born adults using a  $\chi^2$  test. Negative binomial Poisson regression models were used to study the association among immigrant status, total number of risk-taking behaviors, and injuries while controlling for the confounding effects of sociodemographic variables.

**RESULTS:** Of 43,093 adult respondents, 13.3% (95% confidence intervals [CI] = 12.5%–14.1%) of immigrants reported injuries compared with 19.1% (95% CI = 18.7%–19.5%) of U.S.-born respondents. Immigrants had a significantly lower risk of unintentional injuries than U.S.-born adults by most sociodemographic characteristics, but there was no statistically significant association between years of U.S. residence and injuries. Immigrants were less likely than their U.S.-born counterparts to be involved in all 10 risk-taking behaviors ( $p < 0.05$  from  $\chi^2$  test). However, when immigrants engaged in more than four risk-taking behaviors, the difference in injury prevalence between the two groups was not statistically significant ( $p > 0.05$ ).

**CONCLUSIONS:** Immigrant and U.S.-born adults involved in high-risk behaviors face similar risks for unintentional injuries. Targeting risk-taking behaviors among immigrants warrants special attention in injury-control programs.

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**KEY WORDS:** Risk Factors, Emigration and Immigration, Wounds and Injuries, Adult.

## INTRODUCTION

Immigrants are an important and fast-growing segment of the U.S. population, comprising 12% of the total population (1, 2). Because of their contribution to the health of the nation, understanding the health status and needs of the immigrant population is increasingly important for public health researchers and policy makers (1, 3). Lower mortality (4), longer life expectancy (5, 6), and better overall health status (7, 8) have been reported among U.S. immigrants compared with U.S.-born individuals.

Injuries are considered an important public health issue in the immigrant population (9–11). Preventing injuries from occurring is an important public health objective

among the U.S. immigrant population. For example, some immigrants work in dangerous industrial and agricultural occupations, placing them at risk for injury (12). Additionally, devastating injuries have the potential to produce significant economic hardship due to medical costs, the potential loss of a primary wage earner, and the burden of caring for a disabled family member (13). Many immigrant families either are not adequately covered by medical insurance or lack health insurance (1). However, until very recently, unintentional injuries among immigrants have generally been overlooked or categorized only as a subgroup of health issues in studies focused on immigrants in the United States (4, 5, 14).

It is well recognized that risk behaviors are strongly associated with morbidity and mortality in the general population, including nonfatal and fatal injuries (15). Whereas some behavioral risk factors and their association with nonfatal injuries are well documented, there is relatively little research about associations between behavioral risk factors and injuries among the immigrant population in the United States. The purpose of this study was to examine unintentional nonfatal injuries among immigrant and U.S.-born adults in the United States and investigate differences in

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Selected Abbreviations and Acronyms

CI = confidence intervals  
FPL = federal poverty level  
NESARC = National Epidemiologic Survey on Alcohol and Related Conditions  
PR = prevalence ratio  
PSU = primary sampling units

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risk-taking behaviors that may affect the occurrence of injuries. We hypothesized that immigrant adults were less likely to engage in risk-taking behaviors than U.S.-born adults, but when immigrants were involved in similar levels of risk-taking, the prevalence of injuries suffered by them would be similar to that of U.S.-born adults.

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**METHODS**

**Data Source**

Data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) were used for this study. The NESARC study design and sampling procedures have been described in detail elsewhere (16, 17). Therefore, only a brief description is presented here.

The NESARC is a survey conducted among the U.S. civilian noninstitutionalized adult population. Data used in this study came from the cross-sectional NESARC survey conducted in 2001 to 2002. The field data collection for NESARC was conducted by the U.S. Census Bureau, under the direction of the staff of the National Institute on Alcohol Abuse and Alcoholism. Interviewers for the NESARC were professionally trained survey interviewers with an average of 5 years' experience. All potential survey respondents were informed in writing of the nature of the survey, use of the data, confidentiality protection, and rights regarding voluntary participation or withdrawal from the study. Quality control procedures were implemented throughout the interviewing process. Blacks, Hispanics, and young adults 18 to 24 years were oversampled to ensure appropriate representation of minority population. One individual per household was randomly chosen for participation, and consenting individuals were interviewed. A total of 43,093 adults completed interviews with an overall response rate of 81% in the 2001 to 2002 NESARC survey.

The NESARC survey data were weighted to adjust for the probabilities of sample selection, nonresponse, and oversampling of subgroups. The weighted results were representative of the U.S. civilian noninstitutionalized adult population for region, age, gender, and race/ethnicity.

The NESARC survey was reviewed and approved by the Institutional Review Boards of the sponsoring federal agencies.

**Characteristics of Immigrants**

Nativity (foreign born vs. U.S. born) and years of residence in the United States were both reported in the NESARC survey. In our study, respondents were defined as immigrants if they were born outside the United States. This was determined by the answer to the question, "Were you born in the United States?" Immigrant respondents were arbitrarily categorized into three groups according to years of residence (<5 years, 5–14 years, and ≥15 years), based on the answer to the question "How many years have you lived in the United States?" Less than 5 years of residence in a foreign country is usually used in immigrant health studies (7).

Using information about countries of origin, immigrant adults were classified into high-income, upper-middle-income, and low-income groups based on the World Bank income groupings in a recent World Health Organization official publication (18). Residence in the United States and primary employment industry and occupation were also classified into groups. Family income level was determined using the federal poverty level (FPL) and classified as poor (<100% FPL), near-poor (100% to <125% FPL), low income (125% to <200% FPL), middle income (200% to <400% FPL), and high income (≥400% FPL).

**Injury Measurement**

Respondents to the NESARC were asked about injury-related hospitalizations during the previous 12 months. Respondents who reported at least one injury episode were considered injury cases in our study. This was determined by the survey question, "In the past 12 months, how many injuries have you had that caused you to seek medical help or to cut down your usual activities for more than half a day?"

A total of 5112 respondents (12.2%) reported one injury episode, 1401 respondents (3.3%) reported 2 to 3 injury episodes, and 241 respondents (0.6%) reported four or more injury episodes in the past 12 months. Injury information was missing for 1124 respondents (2.6%).

Unfortunately, detailed information about cause of the injury, type of injury, activities involved when the injury event occurred, and place of the injury event were not collected in the NESARC. Therefore, we could not compare these injury characteristics between immigrant and U.S.-born adults in this study.

**Behavioral Risk Factors**

Detailed information was collected in the NESARC survey about a variety of risk-taking behaviors. We selected 10 behavioral risk factors that are generally recognized as risk factors for injuries in published literature. These risk factors cover three main areas, including substance use (tobacco use, drug use, alcohol drinking), drinking and driving, and

other risky motor vehicle driving behaviors. Because the focus of the original survey was on alcohol and substance abuse, nine of 10 risk behaviors we examined were about alcohol, substance use, and motor vehicle driving risk behaviors. Whenever possible, we used information about risk-taking behaviors of the respondent in the 12 months prior to the survey to ensure that risk-taking behaviors and nonfatal injuries occurred in the same study period. However, questions regarding reckless driving, driver's license suspension, and doing dangerous things that easily could have hurt someone were asked about respondents' lifetime behaviors. All questions were self-reported using standardized instruments in health surveys.

We counted the total number of risk-taking behaviors for each respondent, with the assumption that a higher number of total risk-taking behaviors would increase the prevalence of nonfatal injuries.

### Statistical Analysis

Data analyses were conducted using SAS statistical software (19). Because the goals of our study were to compare unintentional nonfatal injuries among immigrant and U.S.-born adults in the United States and to investigate differences in selected behavioral risk factors between two groups, we did not use the weighting structure of the NESARC survey in our statistical analyses.

First, we calculated injury prevalence, injury prevalence ratio (PR), and 95% confidence intervals (CI) for the PR. Then these injury measurements were compared between immigrant and U.S.-born respondents according to gender, age, race/ethnicity, years of education, current FPL, income group based on immigrant's country of origin, length of residence in the United States, and standard classifications of employment industry and occupation. Injury prevalence between the two groups was considered to be statistically significant if  $p$  from the  $\chi^2$  test of difference was less than 0.05.

Second, we calculated the prevalence of injuries by years of residence in the United States and used the  $\chi^2$  test to investigate whether length of stay in the United States had any impact on the prevalence of injuries among immigrant adults.

Third, we calculated the proportion of respondents who were involved in risk-taking behaviors and used the  $\chi^2$  test to determine if immigrant adults were less likely than U.S.-born adults to be involved in behavioral risk factors. To test the second of our hypotheses regarding the association between risk-taking behaviors and injury risk, we compared injury prevalence between immigrants and U.S.-born adults according to their total number of behavioral risk factors.

Finally, we used negative binomial Poisson regression models to control for the confounding effects of

sociodemographic variables when determining the association between immigrant status and nonfatal injuries. This model examined the number of injuries that occurred in the previous 12 months as an ordinal variable. Nativity (foreign born vs. U.S. born), World Bank country of origin income groupings, and the total number of risk-taking behaviors were the variables of primary interest, whereas other variables were considered confounding variables in our regression models. Significant variables in the univariate models were selected into the multivariate models. However, to avoid collinearity in the models, nativity and country of origin were used separately in the multivariate models. We also chose to use employment industry versus employment occupation for a similar reason; however, because the multivariate model with employment occupation resulted in the same conclusions, we did not report the findings about employment occupation in another multivariate model. In general, subgroups with potentially lower injury prevalence were selected as the reference groups.

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## RESULTS

Of the 43,093 respondents in the NESARC survey, 7320 were foreign-born immigrants to the United States. Among immigrants, 13.3% (95% CI = 12.5%–14.1%) reported injuries in the past 12 months compared with 19.1% (95% CI = 18.7%–19.5%) of U.S.-born respondents (Table 1). Immigrants had a lower risk of unintentional injuries than U.S.-born adults by almost all sociodemographic characteristics including gender, years of education, U.S. family poverty level, World Bank country of origin income grouping, residence region in the United States, employment, and occupation. Injury PRs ranged from 1.06 (95% CI = 0.94–1.20) to 1.81 (95% CI = 1.59–2.07). Immigrants who were older than 55 years and who were black did not show significantly different injury prevalence than their U.S.-born counterparts (Table 1). U.S.-born adults employed in agriculture, mining, or construction had the highest injury prevalence (21.5%) compared with U.S.-born adults in other industries. Immigrant workers in these same industries had lower prevalence of injury compared with other immigrant workers (14.0%; injury PR = 1.54; 95% CI for PR = 1.27–1.86). Although most of the PRs were statistically significant at  $p < 0.01$ , the absolute difference in injury prevalence between immigrant and U.S.-born adults by these demographics did not appear to be significantly large, which might be due to the large sample size of the survey.

In general, injury prevalence among immigrant respondents increased with duration of U.S. residence (Table 2). However, the association among years of U.S. residence, injury prevalence, and sociodemographic characteristics was

**TABLE 1.** Injury prevalence and PR of unintentional injuries in the past 12 months among immigrant and U.S.-born adults (>17 years), 2001–2002\*

Selected characteristics	Immigrant		U.S. born		PR (95% CI)
	No. of sample observations	Injury %	No. of sample observations	Injury %	
Gender					
Male	3276	14.4	15,171	20.9	1.45 (1.33–1.59) <sup>†</sup>
Female	4044	12.4	20,451	17.8	1.43 (1.32–1.57) <sup>†</sup>
Age, years					
18–29	1668	12.7	6970	23.1	1.81 (1.59–2.07) <sup>†</sup>
30–54	3975	13.0	16,947	20.0	1.54 (1.41–1.68) <sup>†</sup>
≥55	1667	14.6	11,705	15.5	1.06 (0.94–1.20)
Race/ethnicity					
White/non-Hispanic	1264	16.4	23,162	19.7	1.20 (1.05–1.37) <sup>‡</sup>
Black/non-Hispanic	664	16.1	7556	17.9	1.11 (0.93–1.33)
Asian/Pacific Islander	976	11.5	344	17.4	1.52 (1.14–2.02) <sup>†</sup>
Hispanic	4391	12.4	3886	17.7	1.43 (1.29–1.58) <sup>†</sup>
Education					
Less than high school	2492	12.8	5331	18.4	1.44 (1.28–1.62) <sup>†</sup>
High school	1678	13.3	10,826	18.3	1.38 (1.21–1.57) <sup>†</sup>
Some college	1533	14.8	11,091	21.0	1.42 (1.25–1.61) <sup>†</sup>
College graduate or higher	1617	12.7	8374	18.2	1.43 (1.25–1.64) <sup>†</sup>
Family income as % of federal poverty level					
Poor (<100)	1696	13.0	5468	20.3	1.56 (1.37–1.79) <sup>†</sup>
Near-poor (100 to <125)	595	13.5	1816	17.8	1.33 (1.06–1.66) <sup>‡</sup>
Low (125 to <200)	1447	12.6	5294	19.9	1.58 (1.37–1.83) <sup>†</sup>
Middle (200 to <400)	1970	12.6	11,435	18.8	1.49 (1.31–1.68) <sup>†</sup>
High (≥400)	1612	15.0	11,609	18.8	1.25 (1.11–1.41) <sup>†</sup>
World Bank income groupings of original country					
High income	1430	14.6	35,622	19.1	1.32 (1.16–1.49) <sup>†</sup>
Upper-middle income	2842	13.1			1.46(1.32–1.61) <sup>†</sup>
Low income	1739	12.6			1.52 (1.34–1.72) <sup>†</sup>
Region of U.S. residence					
Northeast	1858	15.0	6322	19.2	1.28 (1.14–1.44) <sup>†</sup>
Midwest	700	13.0	8268	20.2	1.56 (1.28–1.89) <sup>†</sup>
South	2364	12.5	13,739	17.8	1.42 (1.28–1.60) <sup>†</sup>
West	2398	12.9	7293	20.3	1.58 (1.41–1.77) <sup>†</sup>
Residence in metropolitan statistical area (MSA)					
Yes, in central city	3414	13.1	11,529	19.6	1.50 (1.37–1.65) <sup>†</sup>
Yes, not in central city	3505	13.6	16,718	19.5	1.44 (1.32–1.57) <sup>†</sup>
Not in MSA	401	13.0	7375	17.5	1.35 (1.04–1.75) <sup>‡</sup>
Employment industry					
Agriculture, mining, construction	757	14.0	2637	21.5	1.54 (1.27–1.86) <sup>†</sup>
Manufacturing	751	13.5	3146	20.2	1.50 (1.24–1.82) <sup>†</sup>
Transportation/public utilities	351	14.3	2047	19.4	1.36 (1.04–1.78) <sup>‡</sup>
Wholesale/retail trade	907	12.8	4496	20.9	1.63 (1.36–1.95) <sup>†</sup>
Service	2812	14.4	15,591	19.3	1.35 (1.22–1.48) <sup>†</sup>
Never worked for salary	1710	11.1	7308	16.0	1.44 (1.25–1.67) <sup>†</sup>
Employment occupation					
Administrative/professional	1426	13.5	9367	18.5	1.37 (1.19–1.57) <sup>†</sup>
Service/sales	2612	13.6	13,205	20.2	1.49 (1.34–1.65) <sup>†</sup>
Farming, forestry, fishing	171	12.3	525	18.7	1.52 (0.98–2.36)
Transportation/equipment laborer	902	14.5	3196	22.3	1.54 (1.29–1.82) <sup>†</sup>
Other laborer	475	15.6	1725	20.4	1.31 (1.04–1.64) <sup>‡</sup>
Never worked for salary	1710	11.1	7308	16.0	1.44 (1.25–1.67) <sup>†</sup>

CI = confidence intervals; PR = prevalence ratio.

\*Data source: National Epidemiologic Survey on Alcohol and Related Conditions Survey.

<sup>†</sup>*p* < 0.01 from  $\chi^2$  tests of difference in injury proportions between immigrant and U.S. born.

<sup>‡</sup>*p* < 0.05 from  $\chi^2$  tests of difference in injury proportions between immigrant and U.S. born.

**TABLE 2.** Injury prevalence of unintentional injuries in the past 12 months among immigrant adults (> 17 years) in the United States, 2001–2002\*

Selected characteristics	Years of immigrants' residence in the United States			p <sup>†</sup>
	1–4 years, n (injury %)	5–14 years, n (injury %)	≥15 years, n (injury %)	
Gender				
Male	493 (11.4)	982 (13.9)	1769 (15.0)	0.11
Female	507 (10.5)	1196 (10.2)	2308 (13.6)	0.01
Age, years				
18–29	548 (10.8)	761 (12.5)	347 (14.7)	0.22
30–54	418 (11.2)	1248 (11.2)	2280 (14.2)	0.03
≥55	34 (8.8)	169 (13.6)	1450 (14.2)	0.66
Race/ethnicity				
White/non-Hispanic	129 (17.8)	265 (12.8)	859 (16.9)	0.25
Black/non-Hispanic	83 (10.8)	222 (18.0)	354 (15.3)	0.30
Asian/Pacific Islander	182 (7.7)	320 (12.8)	464 (12.1)	0.19
Hispanic	602 (10.5)	1,368 (10.4)	2,383 (13.5)	0.01
Education				
Less than high school	337 (11.3)	792 (11.1)	1335 (13.5)	0.22
High school	218 (13.8)	501 (10.8)	942 (14.2)	0.17
Some college	172 (10.5)	415 (12.8)	937 (15.9)	0.09
College graduate or higher	273 (8.4)	470 (13.4)	863 (13.6)	0.07
Family income as % of federal poverty level				
Poor (<100)	334 (8.7)	547 (11.9)	800 (14.9)	0.01
Near-poor (100 to <125)	83 (15.7)	205 (11.2)	305 (14.1)	0.51
Low (125 to <200)	231 (9.5)	478 (11.3)	724 (14.0)	0.14
Middle (200 to <400)	202 (12.4)	599 (10.4)	1152 (13.4)	0.19
High (≥400)	150 (13.3)	349 (15.5)	1096 (14.9)	0.83
World Bank income groupings of original country				
High income	146 (14.4)	347 (12.1)	928 (15.4)	0.33
Upper-middle income	445 (11.5)	909 (11.7)	1464 (14.0)	0.16
Low income	251 (8.4)	542 (12.9)	925 (13.4)	0.10
Region of U.S. residence				
Northeast	213 (13.2)	506 (13.6)	1107 (15.3)	0.57
Midwest	120 (9.2)	218 (12.4)	354 (13.8)	0.41
South	377 (9.8)	719 (11.5)	1251 (13.4)	0.13
West	290 (11.4)	735 (10.8)	1365 (14.2)	0.06
Residence in metropolitan statistical area (MSA)				
Yes, in central city	503 (10.9)	1054(11.1)	1816 (14.2)	0.03
Yes, not in central city	434 (11.3)	1026 (12.6)	2023 (14.3)	0.16
Not in MSA	63 (7.9)	98 (12.2)	238 (14.3)	0.40
Employment industry				
Agriculture, mining, construction	138 (10.9)	260 (11.9)	351 (16.0)	0.21
Manufacturing	106(10.4)	236 (11.0)	408 (15.7)	0.15
Transportation/public utilities	34 (8.8)	89 (20.2)	222 (12.2)	0.12
Wholesale/retail trade	150 (14.0)	297 (10.1)	456 (13.8)	0.28
Service	341 (10.6)	892 (13.2)	1552 (15.3)	0.05
Never worked for salary	226(9.7)	400 (8.5)	1065(11.9)	0.15
Employment occupation				
Administrative/professional	181 (10.5)	367 (12.8)	865 (14.3)	0.36
Service/sales	338 (11.8)	890 (12.0)	1366 (14.6)	0.14
Farming, forestry, fishing	26 (11.5)	56 (7.1)	86 (14.0)	0.46
Transportation/equipment laborer	148 (8.1)	310 (13.9)	437 (16.7)	0.03
Other laborer	77 (15.6)	153 (14.4)	240 (15.8)	0.92
Never worked for salary	226(9.7)	400 (8.5)	1065(11.9)	0.15

\*Data source: National Epidemiologic Survey on Alcohol and Related Conditions Survey.  
<sup>†</sup>p from  $\chi^2$  test of injury prevalence (%) by years of residence in the United States.

not statistically significant, with the following exceptions: female immigrants (10.5%–13.6%;  $p = 0.01$ ), immigrants of middle age (30–54 years; 11.2%–14.2%;  $p = 0.03$ ),

Hispanic immigrants (10.5%–13.5%;  $p = 0.01$ ), those immigrants living in poverty (8.7%–14.9%;  $p = 0.01$ ), immigrants living in central cities (10.9%–14.2%;  $p = 0.01$ ), and

those immigrants employed as transportation equipment laborers (8.1%–16.7%;  $p = 0.01$ ).

Results from comparisons of risk-taking behaviors between immigrant and U.S.-born adults indicated that immigrants are less likely to be involved in all 10 selected risk behaviors, and the difference between the groups was statistically significant (Table 3). For example, whereas 15.9% of U.S.-born adults reported driving a motor vehicle after three alcohol drinks, only 8.9% of immigrants reported such risk-taking behavior. When the total number of risk-taking behaviors was plotted against injury proportions among

immigrants and U.S. born by gender and race/ethnicity, our results indicated that the prevalence of injury increased linearly as involvement in risk behavior increased (Figure 1).

More importantly, it appeared that a threshold existed in the relationship between total number of risk-taking behaviors and injury prevalence. When both immigrants and U.S.-born adults engaged in three or fewer risk-taking behaviors, immigrants were less likely to suffer injuries ( $p < 0.05$ ). However, when immigrants engaged in more than four risk-taking behaviors, the difference in injury

**TABLE 3.** Proportion of respondents with behavioral risk factors for injuries among U.S.-born and immigrant adults (> 17 years), 2001–2002\*

Selected characteristics	No. of immigrants (%) (n = 7320)	No. of U.S. born (%) (n = 35,622)	p <sup>†</sup>
Tobacco use status			<0.01
Current smoker	1123 (15.3)	9971 (28.0)	
Ex-smoker	885 (12.1)	7180 (20.2)	
Lifetime nonsmoker	5312 (72.6)	18,471 (51.9)	
Drug use status			<0.01
Current user	210 (2.9)	2246 (6.3)	
Ex-user (i.e., did not use in last 12 months)	473 (6.5)	6198 (17.4)	
Lifetime nondrug user	6637 (90.7)	27,178 (76.3)	
Alcohol drinking status			<0.01
Current drinker	3871 (52.9)	23,042 (64.7)	
Ex-drinker	991 (13.5)	6871 (19.3)	
Lifetime abstainer	2458 (33.6)	5709 (16.0)	
Heavy drinking (i.e., drank ≥5 drinks during heavy-drinking period in last 12 months) <sup>‡</sup>			<0.01
Yes	1478 (30.4)	12,141 (40.6)	
No	3330 (68.5)	17,344 (58.0)	
Unknown	54 (1.1)	428 (1.4)	
Drove motor vehicle while drinking in last 12 months?			<0.01
Yes	121 (2.5)	1628 (5.8)	
No	4622 (96.8)	26,437 (93.4)	
Unknown	34 (0.7)	243 (0.9)	
Rode in vehicle while driver was drinking in last 12 months?			<0.01
Yes	219 (4.6)	2375 (8.6)	
No	4475 (94.3)	25,049 (90.3)	
Unknown	51 (1.1)	319 (1.2)	
Drove motor vehicle after ≥3 drinks in last 12 months?			<0.01
Yes	343 (8.9)	3672 (15.9)	
No	3514 (90.8)	19,208 (83.4)	
Unknown	14 (0.4)	162 (0.7)	
Ever get ≥3 tickets for reckless driving?			<0.01
Yes	314 (4.3)	2931 (8.2)	
No	6883 (93.4)	31,797 (89.3)	
Unknown	173 (2.3)	894 (2.5)	
Ever have driver's license suspended for moving violation?			<0.01
Yes	323 (4.4)	2828 (7.9)	
No	6831 (93.3)	31,906 (89.6)	
Unknown	166 (2.3)	878 (2.5)	
Ever do things that could easily have hurt someone?			<0.01
Yes	268 (3.7)	4864 (13.7)	
No	6875 (93.9)	29,864 (83.8)	
Unknown	177 (2.4)	894 (2.5)	

\*Data source: National Epidemiologic Survey on Alcohol and Related Conditions Survey.

<sup>†</sup>p from  $\chi^2$  test of difference of proportions of behavioral risk factor between immigrant and U.S.-born adults.

<sup>‡</sup>Includes only current drinkers and ex-drinkers (n = 4862 for immigrants and 29,913 for U.S. born).

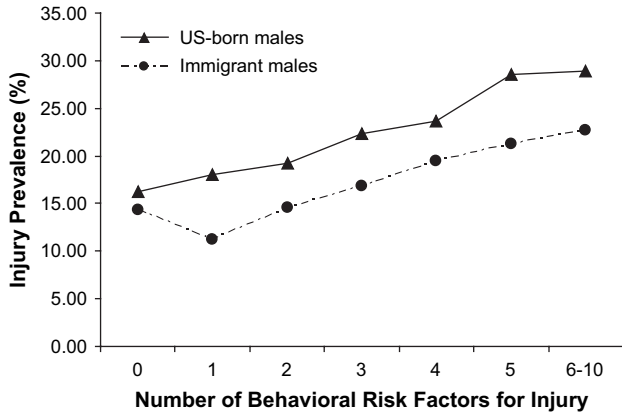


FIGURE 1. Number of behavioral risk factors and injury prevalence.

prevalence between immigrant and U.S.-born adults disappeared ( $p > 0.05$ ). Furthermore, this threshold association between total number of risk-taking behaviors and injury prevalence was more dramatic among women compared with men. However, for both Asians and non-Hispanic blacks, the difference in injury prevalence between immigrants and U.S.-born adults was not statistically significant when the total number of risk-taking behaviors was considered.

Results from the final Poisson regression models indicate that age, race/ethnicity, family poverty level, region of U.S. residence, and total number of risk-taking behaviors were statistically significant confounding variables for injuries when immigrants were still less likely to suffer from injuries (Table 4). Although statistically significant in the univariate model, gender, education level, employment industry, and occupation became nonsignificant variables in the final multivariate regression models ( $p > 0.05$ ).

## DISCUSSION

Using data from a large population-based survey, we compared the prevalence of unintentional nonfatal injuries and risk-taking behaviors between immigrant and U.S.-born respondents. Our results indicated that immigrants in the United States generally had a lower prevalence of unintentional injuries compared with U.S.-born individuals. However, the difference in injury prevalence between the two groups was not statistically significant if the participants engaged in more than four of the 10 risk-taking behaviors examined in our study. Comparisons of risk-taking behaviors indicated that immigrants were less likely to participate in risk-taking behaviors than their U.S.-born counterparts, which may partially explain why immigrant respondents had lower injury prevalence overall.

Previous studies have reported contradictory findings regarding the risk of nonfatal injuries among immigrant populations. Our findings replicated results from a limited number of studies that reported lower injury rates among immigrants than among U.S.-born individuals (20–22). Schewebel and colleagues (20) and Sinclair and coworkers (21) reported lower injury rates from unintentional injuries among immigrant children in the United States. Data analysis of the National Health Ambulatory Medical Care Survey by Simon and associates (22) indicated that Latino children had lower rates of emergency department injury visits than non-Latino white children. However, in that study, immigrant status was not reported (22). The lower rates reported were not associated with differences in health insurance status or with barriers to accessing emergency department care (22). Several studies have reported higher injury risk among immigrant populations (23, 24). In Sweden, a medical record review of 214 pediatric burn patients resulted in a report of increased scalding injuries among immigrant children (24). Both studies reporting higher injury risk among immigrants used data from emergency room visits (22, 24). Emergency room data often reflects more severe injuries than those reported in surveys of the general populations, like those of Schewebel and colleagues (20), Sinclair and coworkers (21), and this study. Further, the two studies using data from emergency room visits focused on children, not adults.

In the adult U.S. immigrant population, an epidemiologic study conducted in Virginia compared nonfatal injuries among nonagricultural immigrant Latino workers with the 1997 U.S. working population (25). Immigrant workers were found to have a higher work-related injury rate (25). In Singapore, the pattern and severity of injuries were similar when foreign workers were compared with local-born workers (23). However, work-related injuries among immigrants may have different characteristics than the more general unintentional injuries examined in our study.

Because contradictory findings have been reported about the risk of nonfatal, unintentional injuries among immigrant populations (21, 23–25), it is challenging to pinpoint underlying factors responsible for the lower injury risk among immigrants. The majority of previous studies examining injuries among immigrants have failed to conduct a comprehensive examination of risk-taking behaviors associated with injuries. In this study, we compared the proportion of immigrant and U.S.-born adults who were involved in risk-taking behaviors generally considered to be important risk factors for unintentional injuries. Our statistical results provided strong evidence supporting our hypothesis that immigrant adults are less likely to have risk-taking behaviors than U.S.-born adults. This may partially explain why immigrant adults in the United States generally have

**TABLE 4.** Poisson regression analysis of unintentional injuries in the past 12 months among immigrant and U.S.-born adults (> 17 years), 2001–2002\*

Selected characteristics	Univariate	Multivariate 1	Multivariate 2
	Parameter estimate (SE)	Parameter estimate (SE)	Parameter estimate (SE)
Birthplace			
U.S. born	0.426 (0.039) <sup>†</sup>	0.272 (0.048) <sup>†</sup>	
Immigrant	Ref	Ref	
Gender			
Male	0.153 (0.027) <sup>†</sup>	0.003 (0.031)	0.011 (0.031)
Female	Ref	Ref	Ref
Age, years			
18–29	0.468 (0.038) <sup>†</sup>	0.305 (0.044) <sup>†</sup>	0.325 (0.044) <sup>†</sup>
30–54	0.264 (0.032) <sup>†</sup>	0.181 (0.027) <sup>†</sup>	0.197 (0.037) <sup>†</sup>
≥55	Ref	Ref	Ref
Race/ethnicity			
White/non-Hispanic	0.498 (0.088) <sup>†</sup>	0.311 (0.097) <sup>†</sup>	0.278 (0.108) <sup>†</sup>
Black/non-Hispanic	0.391 (0.092) <sup>†</sup>	0.286 (0.100) <sup>†</sup>	0.246 (0.110) <sup>‡</sup>
Asian/Pacific Islander	Ref	Ref	Ref
Hispanic	0.248 (0.092) <sup>†</sup>	0.149 (0.096)	0.122 (0.111)
Education			
Less than high school	Ref	Ref	Ref
High school	0.056 (0.043)	–0.071 (0.044)	–0.056 (0.045)
Some college	0.042 (0.04)	0.076 (0.045)	0.088 (0.046)
College graduate or higher	0.207 (0.037) <sup>†</sup>	–0.062 (0.052)	–0.046 (0.053)
Family income as % of federal poverty level			
Poor (<100)	0.130 (0.040) <sup>†</sup>	0.220 (0.048) <sup>†</sup>	0.243 (0.049) <sup>†</sup>
Near-poor (100 to <125)	–0.062 (0.06)	0.080 (0.068)	0.090 (0.069)
Low (125 to <200)	0.006 (0.042)	0.079 (0.047)	0.092 (0.048)
Middle (200 to <400)	0.009 (0.034)	0.031 (0.037)	0.041 (0.038)
High (≥400)	Ref	Ref	Ref
World Bank income groupings of original country			
U.S. born			0.315 (0.090) <sup>†</sup>
High income	0.233 (0.109) <sup>‡</sup>		0.108 (0.117)
Upper-middle income	0.138 (0.095)		0.050 (0.109)
Low income	Ref		Ref
Region of U.S. residence			
Northeast	–0.051 (0.041)	–0.101 (0.044)	Ref
Midwest	–0.035 (0.040)	–0.157 (0.040) <sup>†</sup>	–0.112 (0.045) <sup>‡</sup>
South	–0.163 (0.035) <sup>†</sup>	0.026 (0.043)	–0.165 (0.040) <sup>†</sup>
West	Ref	Ref	0.017 (0.044)
Residence in metropolitan statistical area (MSA)			
Yes, in central city	0.064 (0.039)		
Yes, not in central city	0.045 (0.037)		
Not in MSA	Ref		
Employment industry			
Agriculture, mining, construction	0.261 (0.055) <sup>†</sup>	–0.034 (0.062)	–0.043 (0.063)
Manufacturing	0.138 (0.054) <sup>†</sup>	–0.083 (0.059)	–0.100 (0.060)
Transportation/public utilities	0.119 (0.064)	–0.112 (0.072)	–0.114 (0.071)
Wholesale/retail trade	0.180 (0.048) <sup>†</sup>	–0.078 (0.053)	–0.089 (0.053)
Service	0.132 (0.037) <sup>†</sup>	0.046 (0.042)	–0.060 (0.043)
Never worked for payment	Ref	Ref	Ref
Employment occupation			
Administrative/professional	0.079 (0.040) <sup>‡</sup>		
Service/sales	0.163 (0.037) <sup>†</sup>		
Farming, forestry, fishing	0.119 (0.109)		
Transportation/equipment laborer	0.267 (0.051) <sup>†</sup>		
Other laborer	0.205 (0.065) <sup>†</sup>		
Never worked for payment	Ref		
Total no. of behavioral risk factors for injuries			

(Continued)

TABLE 4. (Continued)

Selected characteristics	Univariate	Multivariate 1	Multivariate 2
	Parameter estimate (SE)	Parameter estimate (SE)	Parameter estimate (SE)
0	Ref	Ref	Ref
1	0.107 (0.038) <sup>†</sup>	0.073 (0.040)	0.064 (0.040)
2	0.312 (0.042) <sup>†</sup>	0.246 (0.045) <sup>†</sup>	0.235 (0.045) <sup>†</sup>
3	0.530 (0.046) <sup>†</sup>	0.427 (0.050) <sup>†</sup>	0.417 (0.051) <sup>†</sup>
4	0.581 (0.056) <sup>†</sup>	0.463 (0.060) <sup>†</sup>	0.448 (0.061) <sup>†</sup>
5	0.880 (0.065) <sup>†</sup>	0.762 (0.069) <sup>†</sup>	0.754 (0.070) <sup>†</sup>
6-10	1.014 (0.398) <sup>†</sup>	0.901 (0.409) <sup>‡</sup>	0.885 (0.409) <sup>†</sup>
Goodness of fit assessment for multivariate model			
Log likelihood		-19115.26	-18628.66
Deviance		18995.43	18514.81
Pearson $\chi^2$		1.255	1.258

Ref = reference group; SE = standard error.  
 \*Data source: National Epidemiologic Survey on Alcohol and Related Conditions Survey.  
<sup>†</sup> $p < 0.01$  from  $\chi^2$  test of parameter estimate.  
<sup>‡</sup> $p < 0.05$  from  $\chi^2$  test of parameter estimate.

a lower injury prevalence than their U.S.-born counterparts. One previous study by Vaughan and associates (26) suggested that cultural differences act as a strong protective factor in maintaining low injury risk among immigrant families. However, when respondents participated in more than four risk-taking behaviors, the difference in injury prevalence between immigrant and U.S.-born adults disappeared in our analyses; therefore, immigrants were equally likely to suffer from injuries if they were involved in risk-taking behaviors like their U.S.-born counterparts. To the best of our knowledge, this finding regarding the association between number of risk-taking behaviors and injury prevalence among the immigrant population has never been previously reported in the literature.

This study has several limitations. First, immigrants in the United States are not a homogeneous group (4, 7, 27). Diversity in demographics, socioeconomic status, and culture exists across immigrant groups. The simplified classification of “immigrant” versus “U.S. born” masks this diversity. Second, information about unintentional injuries was self-reported by respondents in the NESARC and was not verified by medical records; therefore, potential reporting bias exists in the data. Recall bias might be a main issue among immigrants as some of the immigrant respondents might have language barriers or might have interpreted survey questions differently based on their own cultures. However, injuries examined in our study were those injuries requiring medical care or hospitalization; therefore, we believe the recall bias might not be a big issue in this study. In comparison, the potential recall bias in reporting risk-taking behaviors might be a bigger issue for the reason that immigrants might not be as open as U.S.-born adults about their risk-taking behaviors. Third, although a standard survey question was asked in the NESARC about unintentional injuries, other important injury information, such as

leading causes of injuries, types of injuries, places injuries occurred, and severity of injuries, was not included in the survey. There may be a difference between the immigrant and U.S.-born populations in patterns of injuries. Finally, because the NESARC is a household survey administered by the U.S. Census Bureau, undocumented immigrants are likely to be underrepresented in the survey. Unfortunately, the extent of the underreporting of undocumented immigrants in national surveys is unknown and has never been thoroughly investigated. Undocumented immigrants in the United States may have different patterns of life and work than documented immigrants; therefore, additional research is needed to examine unintentional injuries among undocumented immigrants.

Two implications can be derived from the findings reported here: (1) a general classification of nativity of foreign born versus U.S. born without in-depth examination of behavioral risk factors will likely mask unintentional injury risks facing subgroups of the immigrant population in the United States and (2) injury prevention programs should target immigrants in the United States who are involved in risk-taking behaviors that are likely to lead to injuries. Behavioral changes have the potential to help individuals at risk of injuries, and translational research is emerging as an important element in injury prevention as understanding of the association between behavioral risk factors and injury improves (28). Targeting risk-taking behaviors among immigrants warrants special attention in injury prevention in the United States.

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