Objective: To determine the risk of motor vehicle occupant deaths per unit of travel for Hispanic, non-Hispanic black, and non-Hispanic white children (aged 5-12 years) and teenagers (aged 13-19 years).

Design: Comparison of 1989 to 1993 motor vehicle occupant death rates of children and teenagers by race, ethnicity, and sex by using data on mortality from the National Center for Health Statistics, travel data from the 1990 Nationwide Personal Transportation Survey, and 1990 US census data.

Results: Among children 5 to 12 years old, race/ethnicity differences per 100 000 persons were unremarkable, but per billion vehicle-miles of travel, the rates were 14 for non-Hispanic blacks, 8 for Hispanics, and 5 for non-Hispanic whites. Among teenagers aged 13 to 19, the rates per 100 000 persons were highest for non-Hispanic whites; however, the rates per billion vehicle-miles were 45 for Hispanics, 34 for non-Hispanic blacks, and 30 for non-Hispanic whites. Black and Hispanic male teenagers had substantially higher death rates per billion vehicle-miles of travel than either white male teenagers or female teenagers in any racial/ethnic group.

Conclusions: Black and Hispanic children and teenagers are at higher risk of dying in motor vehicle crashes when they travel. Greater public health attention is needed to address these increased risks.

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RESULTS

Among children younger than 4 years, blacks had the highest death rate per 100 000 persons. However, for children aged 5-12 years, Hispanic children had the highest death rate per billion vehicle-miles of travel. Among teenagers aged 13-19 years, non-Hispanic whites had the highest death rate per 100 000 persons, but Hispanic teenagers had the highest death rate per billion vehicle-miles of travel.

Ongoing educational and enforcement campaigns attempt to influence parents to place children in rear seating positions and to increase the correct use of safety belts and child restraints. These efforts should target children in groups with higher death rates and lower rates of safety belt and child restraint use. The need to identify high-risk groups prompted this investigation of motor vehicle occupant death rates by age per unit of travel and per 100 000 people, by racial/ethnic origin, for children and teenagers. In addition, the rapid growth rate of the Hispanic population in the United States (7 times the growth rate for the rest of the population) has called attention to the traffic safety needs of Hispanics.

For the remainder of this article, the term “white” will refer to non-Hispanic whites and the term “black” will refer to non-Hispanic blacks.
SUBJECTS AND METHODS

Motor vehicle occupant death rates per 100,000 people were calculated for ages 0 to 4, 5 to 12, and 13 to 19 years by race/ethnicity for 1989 to 1993, using mortality data from the National Center for Health Statistics and 1990 census data. Traffic deaths having International Classification of Diseases, Ninth Revision (ICD-9) E-codes of 810 to 819 with a fourth digit of 0, 1, or 9 were considered motor vehicle occupant deaths.

Exposure-based rates were calculated, using as numerators the same mortality figures as for population-based rates. Estimates of vehicle-miles traveled and numbers of trips taken for Hispanic, white, and black subjects aged 5 to 19 years were derived from the 1990 Nationwide Personal Transportation Survey (NPTS). The NPTS is a national survey performed periodically by the US Department of Transportation that provides comprehensive data on the amount and nature of daily personal travel. The NPTS is the leading source of data on travel patterns in the United States. Any household within the United States that can be accessed by telephone has a chance of being selected for the survey. Telephones are present in lower percentages of black and Hispanic households (87%-88%) than white households (96%). Consequently, black and Hispanic households with the lowest incomes and lowest rates of car ownership may have been underrepresented in the survey. This would result in overestimates of travel exposure and underestimates of death rates per unit of travel among blacks and Hispanics.

A total of 3668 white, 419 black, and 283 Hispanic households provided vehicle travel data for children aged 5 to 19 years. The NPTS does not collect individual travel data for children younger than age 5. A trip is defined in NPTS as any 1-way travel from one place to another by car, bus, bicycle, foot, or some other means. If the trip involves more than 1 destination, each segment is counted as a separate trip if the travel time between the 2 destinations is more than 5 minutes or if the purposes for travel to these destinations are different. The overall participation rate was 73% among members of the households selected for the survey.

A total of 100,000 persons and Hispanics had the next highest rate (Figure 1). Among children aged 5 to 12 years, race/ethnicity differences were negligible per 100,000 population (Figure 1 and Figure 2). However, death rates per unit of travel differed markedly by race and ethnicity. Blacks had the highest exposure-based death rates. The rate for Hispanics per billion vehicle-miles of travel (8) was 43% lower than the rate for blacks (14), but 72% greater than the rate for whites (5). Rates per 100 million vehicle-trips showed a similar pattern (8, 5, and 4 for blacks, Hispanics, and whites, respectively).

Among teens aged 13 to 19 years, the population-based death rate for whites was almost twice that for blacks (Figure 1 and Figure 3), and Hispanics had an intermediate death rate. However, Hispanics had the highest occupant death rate per billion vehicle-miles of travel: 45, compared with 34 for blacks and 30 for whites. Per 100 million trips, rates were highest for Hispanics and slightly lower for blacks than for whites (32, 24, and 28, respectively), suggesting that the average trip is shorter for black teenagers.

Sex had little effect on mileage-based death rates among children aged 5 to 12 years (Figure 4). For ages 13 to 19 years, however, male rates were substantially higher than female rates per billion vehicle-miles of travel. Black male teenagers had the highest death rate per billion miles (66), followed by Hispanic male teenagers (61), and white male teenagers (37); however, black female teenagers had the lowest rate (14). Rates per 100 million trips showed similar sex differences.

Analysis (not shown) by type of crash (single vs multiple vehicle) revealed no substantial differences among the 3 racial/ethnic groups.

Until now, the very high occupant death rates per unit of travel for black and Hispanic male teenagers (aged 13-19 years) and black and Hispanic children (aged 5-12 years) have been obscured by lack of exposure-adjusted data. Although comparable travel data are unavailable from NPTS for the younger than-5-years group, the population-based death rates for black and Hispanic children for ages 0 to 3 years are higher than the rate for whites (Figure 1), a difference that probably would be even greater if adjusted for exposure.

The true population-based and exposure-based death rates for Hispanics may be even higher than reported in this article because Hispanic ethnicity is underreported on death certificates. Moreover, estimated racial/ethnic differences in risk probably would be even greater if adjusted for urban or rural residence, since occupant death rates are highest in rural areas and rural residence is more common among whites.

The reasons for the very high occupant death rates per unit of travel for black children aged 5 to 12 years and black and Hispanic male teenagers aged 13 to 19 years could not be explored with the databases used in the current study. Further research is needed to elucidate the factors contributing to these elevated death rates. However, racial/ethnic and sex differences in the use of safety
belts and child restraints could be a possible explanation. Several studies have reported lower rates of safety belt and child restraint use among Hispanic children and teenagers than among non-Hispanic whites.\textsuperscript{18-21} Low rates of safety belt and child restraint use also have been reported for black children and teenagers.\textsuperscript{20,21} In a California survey of high school students, Hispanic and black male teenagers reported lower safety belt use rates than white male teenagers; however, racial/ethnic differences in safety belt use were not reported among female teenagers.\textsuperscript{19}

The extent to which differences in safety belt and child restraint use by race/ethnicity are attributable to cultural factors rather than socioeconomic status is unknown. Parental education and income are highly associated with the use of safety belts and child restraints,\textsuperscript{22} with a rate that is 3 times as high in the highest educational and income groups as in the lowest socioeconomic groups.\textsuperscript{21}

Death rates among children may also reflect the driving behaviors, such as driving after drinking, of older family members.\textsuperscript{23} Many studies have reported that Hispanics and blacks are overrepresented in alcohol-related traffic crashes.\textsuperscript{24-29} The 1996 National Roadside Breath Alcohol Survey found that 7.5% of Hispanic drivers, 3.6% of black drivers, and 2.3% of white drivers had high blood alcohol concentrations.\textsuperscript{30}

Motor vehicle occupant death rates also may reflect differences in the vehicles and roads used by His-
panics, blacks, and whites. For example, Wintemute et al reported that in Sacramento County, California, where the rate of vehicle-related drownings was 5 times as high for Hispanics as for non-Hispanics, Hispanics were more likely to live in agricultural areas with irrigation ditches.

Countermeasures to address the lower rates of safety belt and child restraint use by black and Hispanic children and teenagers should be considered. Focus groups of Hispanic community members emphasized that approaches designed to increase use of safety belts and child restraints should be family oriented, highly personalized, and culturally sensitive. Attention to language issues is also needed. Comparable attempts to identify approaches for the black community have not been reported in the literature, possibly due to failure to recognize that black children are at high risk when they travel in motor vehicles. Educational programs are most likely to be successful if they are coupled with active enforcement of safety belt and child restraint use laws.

Another approach to increase the use of child restraints is the free distribution of car seats to low-income populations. Car seat use in New Jersey increased in low-income minority families who were given car seats, regardless of whether they were also given instructions on how to use the car seats.

Scholer et al have recently shown that children at greatest risk of death from injury, especially those in the lowest socioeconomic groups, have persistently higher rates of death from injury even when death rates decline in the child population as a whole. This is further illustrated by data from New Mexico showing that annual motor vehicle death rates for children aged 0 to 14 years declined far more for white than for Hispanic children between 1978-1982 and 1995 (Stuart Castle, MPH, written communication, October 1997).

Greater attention to racial, ethnic, and economic groups at high risk of motor vehicle occupant death and injury is needed. Further research may help to explain the increased risk of black and Hispanic children and teenagers. As countermeasures are developed, they must be evaluated to determine which are most effective among high-risk groups.

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Corresponding author: Susan P. Baker, MPH, The Johns Hopkins Center for Injury Research and Policy, 624 N Broadway, Baltimore, MD 21205.