An Anomaly Within the Latino Epidemiological Paradox

The Latino Adolescent Male Mortality Peak

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Objective: To describe the anomaly of the Latino adolescent male mortality peak in relation to the overall Latino epidemiological paradox and in relation to the need for new conceptual models describing the health of a culturally diverse population.


Participants: California's general population for 1989 to 1997, including California's 15- to 19-year-old and 20- to 24-year-old populations. In 1997, those 2 age groups numbered 4.3 million.

Main Outcome Measures: Mortality rates for Latinos and African Americans compared with non-Hispanic whites expressed as relative risk (RR).

Results: Overall, the Latino RR of mortality follows the Latino epidemiological paradox in that it is lower (RR, <1.00) than that of non-Hispanic whites for most age groups and both sexes. The anomaly within this paradox is seen in Latino males aged 15 to 19 years (RR, 1.77; 95% confidence interval, 1.55-2.02) and 20 to 24 years (RR, 1.79; 95% confidence interval, 1.58-2.02).

Conclusions: This period of elevated mortality risk is labeled the Latino adolescent male mortality peak, and it is an anomaly within the overall Latino epidemiological paradox.

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THERE WERE 4.3 million adolescents, aged 15 to 24 years, in California in 1997.1 Such a large adolescent population, larger than the entire populations of 29 states,2 affords the observation of trends that might be overlooked in smaller adolescent populations. The California adolescent population is not only large, but also experiencing demographic dynamics that make it a bellwether for the adolescent population of the United States in the mid-21st century. In 1997, its ethnic composition was as follows: non-Hispanic white, 44.8%; Latino, 34.2%; Asian/Pacific Islander, 12.1%; African American, 8.2%; and American Indian, 0.7%. It is projected that, by 2020, Latinos will comprise 47.0% of the state’s adolescent population.3 With Latinos forming a large and growing percentage of the state’s adolescent population, it is imperative to understand their health dynamics. This article shows how the Latino adolescent health dynamic fits into the overall Latino health profile.

Preliminary data from the 2000 census indicate that Latinos outnumber African Americans in the United States, thereby becoming the largest minority population in the country. Many models used in social policy (eg, urban underclass) have been applied to Latinos as if the behavior dynamics of all minority groups could be explained by a single model. In health care, the Race and Ethnic Health Disparities model, which repeats this tendency, has been developed during the past 30 years.

The Office of Minority Health, supporting the federal Race and Minority Health Initiative, cites “compelling evidence that race and ethnicity correlate with persistent, and often increasing, health disparities among US populations,”4 and the Office of Research on Minority Health goes on to specify that “African Americans, American Indians/Alaska Native, Asian and Pacific Islander, and Hispanic citizens suffer poorer health and higher rates of premature death than the majority population.”5 In its 1997 position paper, the American College of Physicians provided...
METHODS

The primary data sources for this analysis were California’s 1997 summary death files for death-related information and the State of California Department of Finance population estimates for population denominators. Both sets of files include age, sex, and ethnicity identifiers, with Latinos identified separately from non-Hispanic whites, African Americans, and Asian/Pacific Islanders. The deaths and population estimates were aggregated into 5-year age groups (0-4 years, 5-9 years, 10-14 years, and so on) to compute age-specific death rates for males and females separately.

Because the Latino population in California is so large, there were sufficient events in the adolescent 5-year age groupings to allow estimation of significance. During 1997, in the male 15- to 19-year age group, there were 387 non-Hispanic white deaths, 518 Latino deaths, and 140 African American deaths. In the male 20- to 24-year age group, there were 456, 635, and 235 deaths, respectively. The relative risk (RR) for Latinos and African Americans for each age group was computed for 1997 deaths, using non-Hispanic whites as the comparison base, and 95% confidence intervals (CIs) were calculated.

There were too few deaths in most of these specific age groups to analyze specific causes of death for 1997 alone with reasonable estimates of significance. To examine specific causes of death for each race/ethnic and age group, data were aggregated from the summary death files for the 9-year period of 1989 through 1997 to calculate an annualized rate for a particular cause of death, using the midpoint 1993 population figures for the denominator (because race/ethnic- and age-specific denominators were not available for 1989, 1991, or 1992), then the RR and 95% CI was generated. To track long-term trends for specific causes of death by race/ethnicity, the age groups 10 through 14 years, 15 through 19 years, and 20 through 24 years were combined for each year. Although this aggregation loses the age specificity, it allows a 9-year window to observe trends during that period.

RESULTS

The pattern of Latino male mortality is seen in Figure 1. Before the age of 15 years, the number of deaths among Latino boys is slightly lower than among non-Hispanic whites, but this finding was not statistically significant. In the 15- to 19-year age group, however, the RR for Latinos is nearly twice as high as that for non-Hispanic whites (RR, 1.77; 95% CI, 1.55-2.02). This is the front side of the elevated mortality risk during the late adolescent (15-19 years) and early adult (20-24 years) periods. Because female adolescents conform to the LEP, no further analysis of their mortality rates is presented herein. By contrast, males show a definite counter-trend: in the late adolescent and early adult periods, their mortality is nearly twice as high as that of non-Hispanic whites, returning later in life to the levels expected by the LEP.

Although mortality rates for the general Latino population conform to the LEP pattern, male adolescents are an interesting anomaly in the paradox.

a summary of the relationship between minority status and risk factors, such as poverty, unemployment, and minority group membership in deteriorating inner cities, concluding, “Urban health problems arise from the complex interaction of socioeconomic factors, behavior, environment, and disease that is related to race and ethnicity.” In general, low income, low education, and low access to care are causes of poorer minority health. Although Latino populations often exhibit these classic risk factors, Latino health profiles have presented a paradox to researchers: despite high-risk factors for poor health—low income, low education, low access to care, and increased likelihood of being overweight—Latino health outcomes generally are similar to, or better than, those for whites. This observation is supported by evidence from such key health indicators as infant mortality, life expectancy, mortality from cardiovascular diseases and major types of cancer, and measures of functional health. Overall, this phenomenon is observed in California, where, in 1997, the age-adjusted mortality rate from all causes for non-Hispanic whites was 439.2, whereas the rate for Latinos was 327.4, about 25.5% lower. It seems paradoxical that a minority population with such high-risk factors manages to show such good health profiles; thus, this has been labeled the Latino epidemiological paradox (LEP). Although it has been customary to think of the Race and Ethnic Health Disparities model as applicable to all minority groups, the LEP suggests that this may not be appropriate in every case. Now that Latinos are the nation’s largest minority group, it would be prudent to develop new models that can better explain the health profiles of populations that are not non-Hispanic white, covering both the Latino paradox and the African American disparities. These models have yet to be developed, but the field of adolescent health offers some insight.

In general, adolescence is a period of increased mortality. National statistics show that adolescents aged 15 to 19 years have higher mortality rates than younger children. As Latinos are becoming the largest portion of the adolescent population in California, their patterns rapidly are becoming the norm for adolescent behavior in general. We wanted to determine if Latino adolescent mortality followed the LEP model or presented some other profile. This article considers Latino adolescent mortality (15-19 years and 20-24 years) as part of Latino mortality during a lifespan (birth to ≥85 years). We found that Latina (female) adolescents in these age groups exhibit the general tendency of the LEP, showing no elevated mortality risk during the late adolescent (15-19 years) and early adult (20-24 years) periods. Because female adolescents conform to the LEP, no further analysis of their mortality rates is presented herein. By contrast, males show a definite counter-trend: in the late adolescent and early adult periods, their mortality is nearly twice as high as that of non-Hispanic whites, returning later in life to the levels expected by the LEP. Although mortality rates for the general Latino population conform to the LEP pattern, male adolescents are an interesting anomaly in the paradox.
CI, 1.00-1.26). By this age, the LAMMP has passed. In the age groups 30 to 34 years and 35 to 39 years, the RR for Latino men is slightly lower than for non-Hispanic white men, but this finding is not statistically significant. From the age of 40 years to 90 years or older, the RR for Latino men is significantly lower than for non-Hispanic white men. In contrast, in all age groups until 90 years or older, the RR for African Americans is significantly higher than for non-Hispanic whites.

African American male mortality seems to follow the Race and Ethnic Health Disparities model. Latino male mortality generally follows a different model, the LEP pattern, but with an important anomaly within the paradox: the LAMMP. Further analysis of the LAMMP for the years 1989 through 1997 revealed that the major causes of deaths were homicides and motor vehicle crashes (MVCs), as given in the Table. The LAMMP was not observed in suicide rates.

Latinos consistently had higher rates for homicide than non-Hispanic whites (in ages 10-14 years, RR, 3.95; 95% CI, 3.04-5.13; in ages 15-19 years, RR, 7.71; 95% CI, 6.96-8.54; in ages 20-24 years, RR, 5.34; 95% CI, 4.90-5.82; and in ages 25-29 years, RR, 5.34; 95% CI, 4.90-5.82). The rates for deaths due to MVCs were closer to non-Hispanic white rates, with the Latino rate actually slightly lower in the 10- to 14-year age group (RR, 0.80; 95% CI, 0.66-0.96) and slightly higher in the rest (in ages 15-19 years, RR, 1.06; 95% CI, 1.01-1.12; in ages 20-24 years, RR, 1.20; 95% CI, 1.13-1.28; and in ages 25-29 years, RR, 1.20; 95% CI, 1.11-1.29). Latinos had significantly lower suicide rates than non-Hispanic whites for all age groups.

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**Comparison of Annualized Mortality Rates for Male Latinos and Whites in California, 1989-1997 (per 100,000) Population**

<table>
<thead>
<tr>
<th>Age Group, y</th>
<th>Latino</th>
<th>White</th>
<th>RR (95% CIs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homicide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-14</td>
<td>6.77</td>
<td>1.71</td>
<td>3.95 (3.04-5.13)</td>
</tr>
<tr>
<td>15-19</td>
<td>79.05</td>
<td>10.26</td>
<td>7.71 (6.96-8.54)</td>
</tr>
<tr>
<td>20-24</td>
<td>70.73</td>
<td>13.25</td>
<td>5.34 (4.90-5.82)</td>
</tr>
<tr>
<td>25-29</td>
<td>44.53</td>
<td>12.46</td>
<td>3.58 (3.28-3.89)</td>
</tr>
<tr>
<td>Motor vehicle crashes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-14</td>
<td>5.28</td>
<td>6.64</td>
<td>0.80 (0.66-0.96)</td>
</tr>
<tr>
<td>15-19</td>
<td>35.95</td>
<td>33.84</td>
<td>1.06 (0.98-1.15)</td>
</tr>
<tr>
<td>20-24</td>
<td>47.24</td>
<td>39.26</td>
<td>1.20 (1.13-1.28)</td>
</tr>
<tr>
<td>25-29</td>
<td>31.90</td>
<td>26.68</td>
<td>1.20 (1.11-1.29)</td>
</tr>
<tr>
<td>Suicide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-14</td>
<td>0.75</td>
<td>2.35</td>
<td>0.32 (0.21-0.50)</td>
</tr>
<tr>
<td>15-19</td>
<td>10.63</td>
<td>16.77</td>
<td>0.63 (0.56-0.72)</td>
</tr>
<tr>
<td>20-24</td>
<td>15.36</td>
<td>25.11</td>
<td>0.61 (0.56-0.67)</td>
</tr>
<tr>
<td>25-29</td>
<td>12.40</td>
<td>27.71</td>
<td>0.45 (0.41-0.49)</td>
</tr>
</tbody>
</table>

*Rates are based on a total population denominator. Relative risks (RRs) are based on a population deaths denominator. CI indicates confidence interval.*

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Figure 1. Relative risk of Latino and African American mortality to white mortality by age group, 1997. Bars indicate 95% confidence intervals.
There have been secular trends in mortality for homicide and MVCs that need to be used as context for the 1997 figures. The rate of male homicides seems to have peaked in the mid-1990s, with a gradual decrease since then (Figure 2). This was most noted in African American males, with a rise from 1989 to 1993, then a marked decrease, so that in 1997 African American male rates were much lower than at the beginning of the decade. Latino rates rose slowly from 1989 to 1992, reached a plateau until 1995, then decreased, approaching the 1989 level. Rates for both African American and Latino adolescents are far greater than those for non-Hispanic whites; at one point (1995), Latinos were more than 9 times as likely to die from homicide, and at another (1993), African Americans were 18 times as likely to die as non-Hispanic whites.

For MVCs, there has been a general decline over time for all races/ethnicities (Figure 3). The sharpest decrease occurred before 1992, with some leveling off and then a less striking decline afterward. Latino rates were the highest overall, about 30% higher than white rates in some years. More recently, African American deaths due to MVCs have dipped below those of whites.

For suicides, the general pattern over time is less clear (Figure 4). Although there has been a slight decline in suicides over the years for non-Hispanic white adolescents, these adolescents are consistently at highest risk overall. Latino suicides seem to be increasing somewhat. African American rates have fluctuated from rising above the white rate to decreasing below the Latino rate, with such variation possibly a result of extremely small numbers of cases (eg, 32 in 1996).

The limitations of the data are those inherent in using any large, public administrative data set. A recent National Center for Health Statistics report, providing a summary of current knowledge on the quality and reliability of death rates by race and Latino origin in the official mortality statistics of the United States, concluded that for the non-Hispanic white and African American populations, published death rates were overstated in official publications by an estimated 1.0% and 5.0%, respectively, principally because of undercounts of these population groups in the census. Death rates for Latinos were underestimated by approximately 2.0%. In addition, although there has been nearly 20 years’ experience with Latino ethnic coding, there still is the possibility of miscoding. The population estimates also are subject to error, although by using official State of California Department of Finance estimates, this analysis will share the same error as any other analysis using these population estimates. The strength of using these data is that they are comprehensive, covering the entire universe, and hence not subject to the selection bias inherent in small area studies.

Clearly, further study of the LAMMP phenomenon is needed to understand the causes of this striking anomaly in the LEP. Certain risk factors for adolescent mortality already have been identified for the general population, including structural components such as ease of access to firearms, alcohol use, and education levels of both adolescents and their parents, and psychosocial ones such as exposure to violence or substance abuse. Counterbalancing these are certain general protective factors, such as parental presence, positive role models, and involvement in prosocial activities. The role of both sets of factors, risk and protective, in specifically adolescent male Latino culture requires study and analysis. Furthermore, the LEP in general has been attributed to “cultural protective factors,” but these have yet to be defined. Research aimed at identifying and analyzing these factors not only would add to the further understanding of this Latino norm, but also might provide a basis of com-

Figure 2. Male adolescent (age 15-24 years) mortality rates for homicide by ethnicity and year.

Figure 3. Male adolescent (age 15-24 years) mortality rates for motor vehicle crashes by ethnicity and year.

Figure 4. Male adolescent (age 15-24 years) mortality rates for suicide by ethnicity and year.

Comment
Even though Latino populations often exhibit high-risk factors for mortality (eg, low income, low education, low access to care), they also usually exhibit the LEP (eg, lower age-adjusted mortality). In the general US population, adolescence is seen as a period of increased mortality. This study analyzes, for the first time to our knowledge, the phenomenon of Latino adolescent mortality within the context of the overall LEP. By analyzing the sexes separately, it is seen that the LEP holds for Latina (female) adolescents. In contrast, Latino male adolescents show anomalously higher mortality among the age groups of 15 to 19 years and 20 to 24 years, returning to the LEP pattern after age 25 years. Specific suggestions for further research are provided.

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