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**YOUNG DRIVERS**

# A conceptual framework for reducing risky teen driving behaviors among minority youth

**P Juarez, D G Schlundt, I Goldzweig, N Stinson Jr***Injury Prevention* 2006;**12**(Suppl 1):i49–i55. doi: 10.1136/ip.2006.012872

See end of article for authors' affiliations

Correspondence to:  
Dr P D Juarez, Department of Family and Community Medicine, Meharry Medical College, 1005 DB Todd Boulevard, Nashville, TN 37208, USA; [pjuarez@mmc.edu](mailto:pjuarez@mmc.edu)

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Teenage drivers, especially males, have higher rates of motor vehicle crashes and engage in riskier driving behavior than adults. Motor vehicle deaths disproportionately impact youth from poor and minority communities and in many communities there are higher rates of risky behaviors among minority youth. In this paper, the authors review the data on teens, risky driving behaviors, and morbidity and mortality. They identify areas in which known disparities exist, and examine strategies for changing teen driving behavior, identifying what has worked for improving the use of seat belts and for reducing other risky behaviors. A multifaceted, multilevel model based on ecological theory is proposed for understanding how teens make choices about driving behaviors, and to understand the array of factors that can influence these choices. The model is used to create recommendations for comprehensive intervention strategies that can be used in minority communities to reduce disparities in risk behaviors, injury, disability, and death.

Despite the tremendous strides that have been attained in recent years towards improving overall health status through advances in behavioral and biomedical research, motor vehicle crashes continue to be the leading cause of death for young people 16–20 years of age.<sup>1</sup> Even though the mortality rate among young drivers has been decreasing,<sup>2</sup> young drivers aged 16–24 continue to be at higher risk of being in a motor vehicle crash and for fatal outcomes than middle aged drivers.<sup>3</sup> According to the US Department of Transportation, 3620 drivers in this group died in car crashes in 2004, accounting for 14% of all the drivers involved in fatal crashes and 18% of all the drivers involved in police reported crashes. This figure is high no matter how it is calculated (per 100 000 000 vehicle miles traveled by teens; per 100 000 licensed teen drivers; or per 100 000 teens in the population).<sup>4</sup> In addition, disparities in death, disability, and injury continue to exist for African American and Latino teens in comparison with white youth.<sup>5</sup>

**THE IMPORTANCE OF SAFETY BELT USE**

The major reason teens are killed or seriously injured when involved in traffic crashes is a lack of safety belt use.<sup>6–7</sup> The Fatality Analysis Reporting System (FARS)<sup>8</sup> shows that more than two thirds of teen occupants killed in crashes were not wearing safety belts.<sup>9</sup> According to the 2003 Motor Vehicle Occupant Safety Survey (MVOSS) sponsored by the National Highway Traffic Safety Administration (NHTSA), teen drivers are less likely to wear a safety belt “all the time” (79%) than older drivers (84%).<sup>10</sup> Among teens, African Americans are more likely than non-Latino whites to report not using a seat belt or to be injured or killed while not wearing a seatbelt.<sup>11–13</sup>

According to various NHTSA sponsored state and national safety belt surveys, young people 16–24 are observed wearing safety belts at rates 5–15% below rates for older people.<sup>14–15</sup> Numerous surveys conducted in high school parking lots indicate typical teen belt use is about 50–60%, depending upon the state and the school,<sup>16</sup> but that rates of seat belt use among teens vary dramatically based on age, gender, race, and urban/rural setting and region of the country. Teen seat belt use was found to be only 19% among male African Americans in Jackson, MS.<sup>17</sup> These findings suggest that not only are interventions to increase seat belt use by young people greatly needed, but also that targeted messages among

teens—based on age, gender, race, and urban/rural and regional differences—are also needed.

**UNDERSTANDING RISKY DRIVING BEHAVIOR**

The driving behaviors of teens are influenced by many factors, including their personal levels of knowledge, awareness, skills, and experiences; characteristics of and conditions found in the motor vehicle; and the various conditions of the community in which the teen and his/her family live. Individual characteristics that have been found to be related to motor vehicle morbidity and mortality among teens include race, age, gender, cognition, driving experience, and level of acculturation.<sup>18</sup> Other risk factors for motor vehicle crashes among youth include current biophysiological condition (for example, motor skills, sleep deprivation, and psychiatric/neurological status), mental status (for example, mood, thoughts, feelings),<sup>19–23</sup> and behavioral dispositions (for example, risk taking, impulsivity) that the individual brings to the situation.<sup>24–29</sup>

Inexperience and immaturity both contribute to high crash rates involving teen drivers.<sup>30</sup> Adolescent drivers tend to engage in numerous risky behaviors, including speeding, which has been found to significantly correlate with a greater risk for crashes.<sup>31</sup> They are more likely to engage in other risk taking behaviors such as following too closely, unsafe accelerations, and rapid lane changes.<sup>32</sup> According to 2004 NHTSA data, 17% of young drivers 16–20 years of age had a blood alcohol concentration at or above 0.08%, the level at which all states define drunk driving.<sup>33</sup> Driving safety changes rapidly as novice drivers gain experience and skill.<sup>34</sup> However, lack of driving skill may be less important than poor judgment,<sup>35</sup> which develops more slowly than motor skills with extensive driving experience, and critical brain maturation.<sup>36</sup>

There is growing recognition that teens who engage in risk behaviors often participate in multiple types of risk behaviors, referred to as clustering or co-occurrence of risky behaviour.<sup>35</sup> Evidence suggests that adolescent risk behaviors share common underlying causes such as behavioral, biological,

**Abbreviations:** FARS, Fatality Analysis Reporting System; MVOSS, Motor Vehicle Occupant Safety Survey; NHTSA, National Highway Traffic Safety Administration; YRBS, Youth Risk Behavior Survey.

family, school, and neighborhood factors.<sup>36</sup> In addition to monitoring adolescent participation in specific driving behaviors, it is important to focus on risk taking among teens and to monitor them for signs of any risky behaviors.

Behavioral choices are influenced not only by personal beliefs and histories, but also by family and peer expectations. Family expectations, parental conditions on driving by teens, and level of communication between parents and teen drivers may affect the risk taking behavior of teens. Similarly, peer expectations about driving safely, wearing seat belts, and risk taking also may influence the likelihood of teen drivers engaging in risky driving practices.<sup>39-41</sup>

Characteristics of the motor vehicle and conditions within the vehicle present another level of variables that need to be examined as potential risk/protective factors for teen motor vehicle crashes. Performance, size, age, value, and vehicle design, including safety characteristics, have been found to be closely related to teen driving behaviors and outcomes.<sup>42</sup> Older model cars, because of their larger size, may increase risky driving behaviors by giving teen drivers a false sense of safety or because older models generally have less value and offer a sense of "less to lose".

Likewise, conditions within the vehicle also have been found to affect teen driving behavior and outcomes. The presence and number of passengers in the car, passenger ages, passenger behaviors, and distractions—including alcohol, music, and cell phones—are associated with risky driving behaviors and adverse outcomes.<sup>7 43 44</sup> See also papers by Williams and Shope in this supplement.<sup>45 46</sup>

The physical environment outside the car, including street conditions such as presence of street lights, signage, speed bumps, passing lanes, as well as weather and time of day, also play a role in teen driving behavior and crash risk. Differences in rural and urban settings create different kinds of risks for young drivers.<sup>47</sup> The social, political, and economic environments found at the community level also have been found to shape the development of a teen's frame of reference about driving behaviors, including knowledge, attitudes, awareness, and expectations, which in turn influence how the teen will respond when presented with the choice between risky and safe behaviors.<sup>48</sup> The social environment includes many factors, including urban crowding, exposure to media, community norms about wearing seat belts, cultural standards regarding drinking while driving, presence of law enforcement, and police ticketing practices. All of these social contextual conditions have been found to be associated with teen driving behaviour.<sup>49-53</sup>

The political and policy environments of state and/or local governments also are closely related and can play an important role in influencing teen driving. The level of support for public policies such as primary and secondary seat belt laws, drinking while driving, having auto insurance, allocation of resources to enforce laws, and the activity of interest groups who support or oppose certain laws have been found to affect teen seat belt use.<sup>54-56</sup> At the community level, economic factors are associated with teen motor vehicle driving.<sup>57 58</sup> Whether and when teens have access to a car and the purpose for driving (school, work, recreation) often depend on a family's financial circumstances. Family finances may be affected by macro economic cycles, region, ethnicity, and geography.

## RISKY DRIVING BEHAVIOR AMONG MINORITY TEENS

Other than for seat belt use, the evidence is unclear about differences in risk taking behaviors among African American and Latino teens in contrast to other racial/ethnic groups. There is growing evidence of a relationship between early onset of drinking and involvement in motor vehicle crashes

among individuals aged 18 and older.<sup>59</sup> Adults who started drinking by age 14 were three times more likely to report driving after drinking than those who began drinking after age 21. Crashes were four times more likely for those who began drinking at age 14 when compared to those who began drinking after age 21.<sup>59</sup> Results from a study using data from the 1997 Youth Risk Behavior Survey (YRBS) found that black youth were less likely to drink than whites, Latinos (males) equally likely, while Latinas (females) and males of "other" racial backgrounds were more likely to be current drinkers. Both blacks and Latinos, however, reported higher rates of drinking related risky behavior (including driving after drinking) than did whites. The higher rates of driving after drinking might be because blacks and Latinos tend to be concentrated in areas associated with community risk factors for drinking (for example, poverty, billboard advertising, greater number of off-premise sales establishments).<sup>60</sup>

Other research suggests that Latinos, especially newly arrived immigrants, may be more likely than the general population to drink and drive as they may be unaware of US traffic laws.<sup>61</sup> A recent survey found that Latino males have the highest rate of ever having been arrested for driving under the influence of alcohol. Study results indicate that Latinos believed the number of drinks needed to affect driving was generally higher than the number perceived by whites and blacks. One fifth of Latino males who drove a car during the 12 months before the survey reported being drunk enough to be in trouble if stopped by police.<sup>61 62</sup> However, it is unclear whether differences found among Latinos are the same for teens as adults, for Latinos with different immigration status, and of different national origins (Mexican, Puerto Rican, Cuban, Central American).

## REDUCING ADVERSE OUTCOMES OF MOTOR VEHICLE CRASHES AMONG MINORITY TEENS

Minority teen injury, disability, and death resulting from motor vehicle crashes can be reduced through three categories of interventions: (1) those targeting the general population; (2) those focusing on teens in general; and (3) interventions that specifically target minority youth. To date, most interventions have relied on strategies that fall into the first two categories, while few have specifically targeted minority youth. Efforts that target the general population of drivers have focused primarily on changing driving behaviors through education, public policy, modifying the motor vehicle, and/or altering the environment.

### Strategies that target the general population

Interventions that have been identified as having the greatest potential for increasing teen safety belt use include: changes in public policy, such as primary and secondary enforcement laws; high visibility enforcement, *Click it or ticket* mobilizations; and increased sanctions for safety belt violations, including increased fines and points on the driver's license.<sup>63</sup>

Teen seat belt use has been found to be higher in states with primary safety belt laws.<sup>64</sup> McCartt and Shabanova<sup>20</sup> reviewed nationwide crash data and found that teens aged 16-19 used safety belts to a higher degree in states with primary belt laws. The highly publicized *Click it or ticket* enforcement efforts have demonstrated that safety belt use will increase even in secondary enforcement states if frequent, consistent, and sustained *Click it or ticket* enforcement is tailored to young drivers (for example, near high schools, colleges, recreational facilities) by publicizing it on youth oriented radio stations and television channels, etc.<sup>65</sup> Focus groups we have conducted with African American youth as well as policy makers, however, have raised a strong level of concern that strong enforcement efforts of primary safety belt laws will lead to increased racial profiling of

minority drivers. Even though enhanced, highly visible enforcement and media publicity have been shown to be highly effective, there are significant personnel and financial resource limitations to those approaches.

Other public health interventions to increase motor vehicle safety that benefit teens include strategies that have targeted vehicular changes, such as safety belt use monitoring devices, ignition interlock devices, and improvements in comfort and convenience.<sup>66</sup> Manufacturers encounter resistance to some of these strategies (for example, interlock devices) due to adverse public opinion and are consequently resistant to large scale investment in them. Changing roadway design also has been used to influence driving behaviors. Features like left turns across busy lanes, unprotected turn signals, poorly timed traffic signals, and multilane roads have been demonstrated to increase crash risk.<sup>67-69</sup> Alterations to the physical environment have included changes to the transportation infrastructure through roadway design, roadway hazards, and safety features. They include adopting features like four-way stops, speed bumps, islands, and roundabouts to slow traffic.<sup>70-72</sup> Efforts to address low lighting conditions and wet or icy roads also have been undertaken to reduce the risk of motor vehicle crashes.<sup>73 74</sup>

### Strategies that target teen drivers

There has been increasing recognition, however, that strategies that target the general population do not necessarily have the same effect on all segments of the population. Increasingly, interventions have been implemented that target improved safety and reduced crash risk specifically among teens.

A majority of states has now adopted graduated driver licensing (GDL) laws. Some of the GDL laws either include safety belt use as a provision or provide for sanctions if a safety belt violation occurs. Safety belt provisions are not always incorporated into GDL laws, however. Even where they exist, some teens and their parents are not aware of seat belt requirements of GDL. GDL laws could be used to provide cause for stopping young drivers and ascertaining compliance with safety belt laws. However, not everyone agrees with adding safety belt provisions to GDL. Focus groups that were conducted with African American youth and black mayors have voiced concern that this provision might lead to racial profiling.<sup>75</sup>

The most common prevention strategy to change teen seat belt use behavior has been education, especially school based interventions.<sup>76-78</sup> Schools are the primary social institutions that provide access to youth under the age of 20 and therefore are an ideal setting for health and safety interventions. An educational approach typically focuses on changing knowledge and beliefs, modifying attitudes (for example, increase self-esteem or personal commitment), and teaching new skills. Content areas that have been identified as necessary for an effective prevention curriculum include: normative education, social skills, social influences, perceived harm, protective factors, and refusal skills. These strategies also include broad based approaches such as driver's education courses and school based and/or public health education campaigns.<sup>35 79</sup>

Incentive programs which reward teens for buckling up, such as high school reward programs and insurance incentives, have also been identified as potentially effective. Other promising strategies include parental management to monitor teens more closely and establish restrictions on teen driving, and school and employer policies that mandate seat belt use by students and employees. Most interventions that have been proposed or implemented which use education and persuasion approaches have relied on universal approaches that target individual level characteristics for

change, usually knowledge, attitudes, and behaviors. These interventions are often associated with adolescent developmental theory and target inexperience, immaturity, a sense of immortality, emotionality, sensation seeking, risk taking, peer influence, influence of parents, and distractions.<sup>14 28 80-84</sup> Universal messages such as these tend to target "typical" teens with a "general" message. The extent to which a teen identifies with both the way the message is presented as well as with the messenger may affect its impact on behavioral change.

Fell *et al* described various community approaches that have been successfully implemented to increase safety belt use among young people.<sup>85</sup> They include strategies that target not only teens, but also their families, school, neighborhood, and surrounding community. These approaches often incorporate both risk and protective factors. He found that the most successful motor vehicle crash injury prevention programs targeting teens tend to use a variety of strategies that are aimed not just at the teen, but at the environmental context as well.<sup>85</sup> Specifically, Fell reported that effective prevention education programs typically include some combination of knowledge content, social norming, personal commitment, and resistance skills strategies.<sup>85</sup> These programs have demonstrated up to a 71% increase in seat belt use based on observations.<sup>85</sup>

Media campaigns that target teens have been offered as a way to affect teen driving behavior. Much of our knowledge about effective strategies for altering risk taking behaviors using mass media is derived from research that has been undertaken in the areas of smoking and substance abuse prevention and control.<sup>86-90</sup> Campaigns which have been part of more comprehensive programs, specifically high intensity media campaigns combined with school education programs and/or other community level interventions, have been found to be the most successful. This suggests that there are synergies from multiple interventions that simultaneously address different levels such as individual, school, neighborhood, or public policy.<sup>91</sup>

### Strategies that target minority youth

To influence social norms and behaviors in minority communities, strategies will be needed that incorporate different levels of interventions such as health education, public media campaigns,<sup>92 93</sup> community messaging, and traffic law enforcement.<sup>92 94</sup> Community based strategies that engage the target population in prevention efforts are likely to be the most effective. For instance, focus groups can be conducted with the target population (for example, African American teens) to help in the development and/or adaptation of developmentally, culturally, linguistically, and environmentally appropriate messages. The most successful media campaigns employ a social marketing approach in which multiple themes are directed at specific demographic groups (for example, Latinos, African Americans, etc), followed by consumer testing and feedback, and then message adjustment based on the feedback.<sup>95 96</sup> See also the paper by Smith, this supplement.<sup>97</sup>

Other community messaging strategies could include engaging families, schools, the faith community and other local institutions, organizations, and businesses to reinforce a "buckle up" message that is likely to be more effective than a general teen communication campaign.

A peer-to-peer (service learning) approach has been found to be an effective alternative to traditional public health education campaigns. Service learning overcomes some of the barriers associated with an inappropriate message and/or messenger found in traditional health education campaigns.<sup>98-100</sup> It is rooted in experiential learning theory and involves methods under which students learn and develop

through active participation in thoughtfully organized service that: (1) is conducted in and meets the needs of a community; (2) is usually coordinated with a secondary school or institution of higher education; (3) helps foster civic responsibility; (4) is integrated into and enhances the (core) academic curriculum of the students in which the participants are enrolled; and (5) provides structured time for the students or participants to reflect on the service experience.<sup>98</sup>

Using the service learning model to increase seat belt use among minority teens is a promising new approach being studied by the Meharry-State Farm Alliance, National Center for Optimal Health at Meharry Medical College. A total of six high school service learning programs in Columbus, Ohio; Detroit, Michigan; and Jacksonville, Florida are presently participating in a study to assess their impact on teen seat belt usage. Preliminary results suggest that students respond well to other students who structure health promotion messages and strategies. The peer-to-peer model used in service learning is consistent with research that has found teens to be heavily influenced by their peers and helps to ensure that the messengers and messages are culturally appropriate.

### A MULTILEVEL APPROACH TO PREVENTING DEATH AMONG MINORITY TEENS FROM MOTOR VEHICLE CRASHES

Understanding how minority youth make decisions regarding driving and risk taking behaviors and the variables that influence those decisions requires articulation of a dynamic, theoretical framework. The factors that influence the driving behaviors of minority teens, the likelihood that they will engage in risk taking or health promoting behaviors and activities, and how characteristics of both the motor vehicle and the environment affect them, and subsequent outcomes must be incorporated into the framework.<sup>101 102</sup>

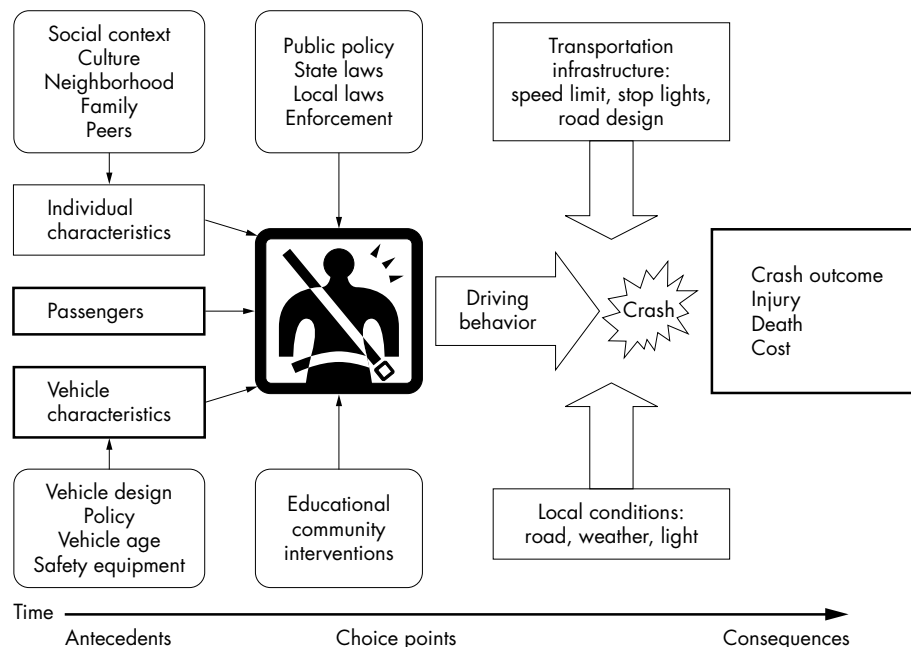
In figure 1, we present a multifaceted, multilevel model that is based on ecological theory<sup>103-106</sup> for understanding minority youth driving behavior and its consequences. This model views teen behavior as dynamically interacting with and responsive to a series of expanding spheres of environ-

mental influence.<sup>107 108</sup> This multilevel approach is useful because it allows for the consideration and integration of current and historical, social, cultural, economic, and political conditions as potential sources of influence on individual behavior.<sup>109</sup>

According to this model, the same complex systems that create the context for behaviors also mediate and moderate the consequences of these behaviors. Some consequences are immediate, while others are intermediate or long term. Adverse outcomes of driving behaviors are typically described in terms of personal injury, disability, and death. Yet, outcomes of behavioral choices also have a detrimental effect on others, including family members, peers, neighbors and the community. Some choices have long term personal, physical, emotional, and financial consequences (for example, serious injury, drunk driving conviction, increases in insurance rates)<sup>110</sup> while others may have incremental effects on social, political, environmental, and economic systems (the activism of Mothers Against Drunk Driving is an example).

While this model of teen driving behavior is presented as moving through time from left to right, in reality it is an iterative process in which new events continually combine with antecedents to influence the choices of the individual in the present. Choices made in the present affect subsequent behavioral decisions, creating new situations that influence and constrain future choices. It is in the present, however, that an individual has an opportunity to make choices about driving behaviors that increase or decrease the risk of a crash.

The proposed model is offered as a guide for considering the range and combination of strategies that might be adapted within a community to change the driving behaviors of minority youth. The model asserts that multifaceted and multilevel interventions hold the greatest promise for reducing risky minority teen driving behaviors and their adverse outcomes rather than interventions that target only one level of risk factor. Interventions that engage communities in their development and implementation are likely to be more effective than solutions imposed by experts or government agencies. While participatory approaches are important in all communities and with all teens, engaging



**Figure 1** A multilevel, multisystems model of driving behaviour.

the community is critically important for minority teen populations. Messages must be presented in an age appropriate and linguistically appropriate manner and in a time and place where the message will be heard. The messenger must be someone with whom minority teens can readily identify, and the message must address the unique social realities they experience, and be presented through a medium to which the target group is receptive.

Safe driving campaigns should consider using a range of engaging delivery media such as foreign language radio stations and other non-traditional media outlets to reach the widest audience. For urban African American youth, this may mean using hip-hop music, advertising, youth websites, and text messaging as potential media for getting the message out. In rural areas, by contrast, strategies might include use of billboards, flyers, and talk radio. In a rural area, influential figures for teens may be more likely to be the faith community, community leaders, and authority figures, whereas in an urban environment, the most effective messengers may be entertainers, sports figures, or celebrities.

Inner city and rural communities of high poverty where minority teens are most likely to live often lack social and economic resources that provide teens with opportunities for healthy growth and development. Interventions that target behavioral change among minority youth must be responsive to their unique physical, social, political, and economic environments. In low income communities of color, strategies that coordinate with and/or are integrated into other public health interventions need to take advantage of existing social capital. Many community organizations already work with minority teens on issues such as HIV/AIDS prevention, substance abuse prevention, violence prevention, conflict resolution, and sexuality education. Where effective programs exist, advocates should partner with these organizations to add information about seat belt use and other risk factors for motor vehicle crashes.

## CONCLUSIONS

Despite a continuing decline in the adverse effects of motor vehicle crashes in the general population of the US, and in teens, disparities in death, disability, and injury continue to exist for African American and Latino teens in comparison with white youth. We suggest that while it is important to continue efforts to affect changes in behaviors through health education, media, and changes at the community level, disparities in outcomes continue to exist. We present a model of teen driving behavior based on ecological theory that offers a more comprehensive and dynamic approach for reaching minority teens. For effective strategies to increase teen seat belt use, however, they also must address the ways in which the physical, social, political, and economic environment of a community shape individual behaviors. We propose that efforts which employ multiple levels of prevention strategies, culturally and linguistically appropriate messaging, and engage the target population in the development and implementation of targeted strategies will be more effective. These multilevel, multifaceted interventions hold great promise not only for reducing motor vehicle injury, disability, and death among minority teens, but also for reducing disparities in these outcomes.

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## About the senior author

Nathan Stinson Jr is the former Deputy Assistant Secretary for Health and the Director of the US Office of Minority Health and Assistant Surgeon General (1999–2004). In that capacity he served as the principal advisor to the Secretary of Health and Human Services on minority health. He has served as Director of the Center for Optimal Health at Meharry Medical College since January 2005. Dr Stinson received an MA from the University of California and a PhD from the University of Colorado, both in environmental biology. He earned an MD degree from the University of Colorado Health Sciences Center in 1981 and an MPH in Health Care Administration from the Uniformed Services University of the Health Sciences in 1990. The Center for Optimal Health (COH) is designed to maximize the health, healthcare delivery systems, and community health programs of racial and ethnic minority populations through public policy, research, and health education intervention. Primary areas of focus are unintentional injury prevention, cardiovascular disease, diabetes, obesity, cancer, and HIV/AIDS.

## Authors' affiliations

**P Juarez, I Goldzweig, N Stinson Jr**, National Center for Optimal Health, Meharry Medical College, Nashville, TN, USA

**D G Schlundt**, Department of Psychology, Vanderbilt University, Nashville, TN, USA

**P Juarez, I Goldzweig, N Stinson Jr**, Department of Family and Community Medicine, Meharry Medical College, Nashville, TN, USA

**P Juarez**, Meharry EXPORT Center for Health Disparities, Nashville, TN, USA

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