Title

Vehicle Occupancy and Crash Risk

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ABSTRACT
This study explores the association between vehicle occupancy and a driver's risk of causing a fatal crash, not wearing a seatbelt, and using alcohol. The survey population is the set of drivers represented in the Fatal Analysis Reporting System (FARS) (years 1992 to 2002). The independent variables are driver age, driver gender, passenger age, passenger gender, and vehicle occupancy. The outcome variables are whether the driver was at fault in causing the fatal crash, whether the driver wore a seatbelt, and whether the driver had been using alcohol. For male teenager drivers, driving with teenage passengers correlated with an increase risk of causing a crash. For all female drivers, and for male drivers over age 40, passenger presence correlated with a reduced risk of causing a fatal crash. Drivers age 15 to 30 were less likely to wear a seatbelt when passengers were present, than when driving solo. Drivers age 50 and above had higher seatbelt use rates when passengers were present. This protective effect of passengers was stronger for male drivers than female drivers, and for male drivers the effect increased by age. Drivers age 15-34 accompanied by passengers were more likely to have consumed alcohol than solo drivers of the same age group. These results offer an interesting perspective for research in the area of driver distraction, and update current knowledge on older drivers and the role of seatbelt and alcohol awareness.

INTRODUCTION

In 2003, about 2,889,000 people in the United States were injured in motor vehicle crashes, and 42,643 were fatally injured (*1*). Of these victims, teenagers (age 16 to 21) have the highest motor vehicle injury rate of all age groups (*2*). Past studies indicate that passenger presence, especially teenage passengers, greatly increases the crash and fatal injury risk to teenage drivers (*3*). These results and related findings have resulted in some states' implementation of Graduated Driver Licensing (GDL) policies designed to restrict the number of teenage passengers that a teenage driver can carry (*4*). Despite these findings, few researchers have studied the effects of vehicle occupancy on the crash risk of adult drivers. Almost 70% of all motor vehicle fatalities occur to adults over the age of 25, so investigating the causes of adult crashes is also important (*5*). This paper focuses on the crash risk for adult drivers, including older adults, as it relates to vehicle occupancy.

Motor vehicle travel is the primary mode of transportation for most Americans, and much of that travel takes place in vehicles occupied by at least two individuals. In the United States, over half (56.5%) of all trips in personal vehicles are taken in vehicles with multiple occupants (*6*). Mean vehicle occupancy per mile is 1.63 persons (*6*). In a typical week, mean occupancy rates are 1.50 on weekdays and 2.00 on weekends (*6*). Occupancy rates are lowest from 5am to 8am and peak from 7pm to 10pm (*6*). Travel to work has the lowest average vehicle occupancy per mile (1.14 occupants), and social or recreational trips have the highest (2.05 occupants) (*6*). Little research has been published about the relationship between driver performance and the ages of their passengers, so it is difficult to identify more specific situations, such as children being driven to school, families or couples on vacation, or co-workers carpooling.

Reuda-Domingo et al., offers perhaps the most conclusive and thorough study of vehicle occupancy (*7*). Based on ten years of fatal crash data from Spain, the authors conclude that passengers have a protective effect on drivers. The protective effect is highest for drivers ages 45 to 64 and for female passengers accompanying male drivers (*7*). Other evidence of the safety effects of vehicle occupancy's on the crash risk of experienced drivers is contradictory. In a non journal publication, Reib and Kruger find an overall protective effect of passengers for all drivers (*8*). Preusser, Ferguson, and Williams focus on the association between vehicle occupancy and crash risk among teenagers (age 16 to 19) but they also include findings for adult subgroups, ages 30 to 59, 60 to 69, and 70 and over (*9*). They found that for drivers age 24 and under, passenger presence was associated with a higher likelihood of drivers being at-fault in a fatal crash. However, adult drivers with one or more passengers were significantly less likely to be at-fault than drivers no passengers. Hing, Stamatiadis, and Aultman-Hall focus on the crash risk for older drivers (age 65 and above) in data from Kentucky State Police Reports (*10*). They found that the presence of two or more passengers is associated with a decrease in crash risk for drivers age 75 and older. In contrast to Preusser et al, and Reuda-Domingo et al, and Hing, Stamatiadis, and Aultman-Hall found that the presence of passengers did not affect drivers age 65 to 74 (*9*), (*7*), (*10*).

Some studies of older drivers mention the involvement of "co-pilots", or passengers who assist the driver in making observations about road scenarios (*11*), (*12*), (*13*). However, these publications do not address how vehicle occupancy affects safety. Co-pilots might affect drivers through a variety of interactive mechanisms. Passenger presence might alter a driver's performance because the driver might act cautiously to protect the well-being of a child or other passengers. The passenger may provide assistance to the driver, for example, as a co-pilot (or even as a "backseat-driver") by providing visual assistance, navigation, or collision-warning advice. Also, a passenger might assist in non-driving tasks such as adjusting radio and temperature dials or making cellular phone calls for the driver. In contrast, a passenger might distract a driver, for example, by engaging them in non-driving activities such as conversation or by challenging the driver to drive recklessly.

Previous research on driver behavior (as opposed to crash statistics) offers some additional insights in the effect of passengers on older drivers. Baxter, et al, found that both signaling and speeding was reduced when passengers were present in vehicles (*14*). Evans and Wasielewski found that on average, drivers with passengers adopt longer following headways (distrance from the vehicle in front of them) than solo drivers, and MacKay found that drivers with passengers drive at slower speeds than solo drivers (*15*), (*16*). Following headway and speed are two surrogate measures of safety, and one would expect the analysis of crash data to yield similar findings.

To offer an additional perspective of adult and elderly drivers, and to offer new knowledge relevant to the field of driver distraction, this article investigates the effects of driver age and gender and vehicle occupancy on crash risk. This report also examines the effects of vehicle occupancy on driver seatbelt use and alcohol presence. The data include eleven years, 1992 to 2002, of U.S. fatal crash records in the Fatal Analysis Reporting System (FARS). Controlling for the driver's collision history, the presence of alcohol, driver seat belt use, and time of collision, the data analysis addresses the question of whether the presence of passengers affects the driver's risk of causing a fatal crash, not wearing a seatbelt, and being under the influence of alcohol. The analysis tests whether the associations varies across age and gender groups.

METHODS

Data

Fatal crash data were selected from the FARS database for years 1992 through 2002. The FARS dataset is maintained by U.S. National Highway Traffic Safety Administration (NHTSA), and it is designed to include data from all fatal vehicle crashes in the United States. To control for the increased likelihood of fatality during a collision due to more passengers in a vehicle, this study includes driver data where the driver was involved in a collision that killed at least one driver (him/herself, or the driver in another vehicle, or both).

For this study, drivers who had passengers on board at the time of the collision were compared to drivers without passengers. In keeping with methodology defined by Preusser, et al, drivers were considered “at-fault” if they drove vehicles involved in single vehicle crashes or if the driver’s behavior, as recorded in FARS dataset, including unsafe maneuvers such as swerving in a lane or failing to use a turn signal (i.e., FARS Driver Related Factors #20-68) (*9*). About fifty-seven percent of all fatal crashes involved a solo vehicle. Drivers for whom the Driver Related Factor was coded “unknown,” were excluded from analysis. [In the vast majority of cases, this variable is coded as a specific state or action, or as “none” (as opposed to “unknown”)]. In addition, drivers of unknown gender or age were excluded from the sample. The final sample size was 93,635 drivers with passengers and 264,255 solo drivers.

We categorized the drivers by five-year age group and gender. Due to low numbers of fatal crashes with several passengers, groups with one or more passengers were aggregated. For each driver, we examined attributed culpability (i.e., at fault based on FARS data) while controlling for eight independent variables. Control variables included seatbelt use and alcohol involvement at the time of the collision; history of previous collisions; history of causing a collision under the influence of drugs or alcohol; current or previously suspended or revoked driver’s license; previous citations for speeding; and other citations for moving violations such as running a traffic signal. Another control factor was whether the collision occurred during the day (6:00 to 18:59 hours on a 24-hour clock) or night (19:00-5:59). For the analysis of occupancy and seatbelt use, we used the same control variables (obviously, excluding seatbelt because seatbelt was the test variable); for the analysis of alcohol presence and seatbelt use, we also used the same control variables (obviously, excluding alcohol).

To a limited extent, the age and gender of the front-seat passenger was also included in the analysis. Generally, findings were not significant ($p > 0.05$), so we only include a brief discussion of teenage drivers driving with young versus adult passengers. Drivers were excluded from our analysis if their passenger’s age or sex was unknown. If no passenger was seated in front, a random passenger seated in the back of the vehicle was chosen. For this analysis, driver and passenger pairs were considered by ten-year age group and gender.

Analysis

This study analyzes Mantel-Haenszel adjusted odds ratios (aOR) to test whether passengers were associated with a lower proportion of drivers at-fault in a fatal collision. Adjusted odds ratios were also completed to test the association between passenger presence and seatbelt use, and passenger presence and alcohol use. For each gender and age category, sets of two-by-two matrices were constructed: one matrix for each possible setting of Boolean values describing alcohol use, time of day (night/day), seatbelt, and previous collision histories (That is, there were eight control variables, so 256 two-by-two matrices were considered for each group defined by age and gender. See Table 1 for an example). The odds ratio of the weighted sum of these matrices (weighted by the total number of collisions in each matrix), as well as the corresponding 95% confidence interval, are given. Solo drivers are represented in the first row of each matrix, so each adjusted odds ratio X should read “For every driver without passengers involved in a fatal crash, X drivers driving with passengers were involved in a fatal crash”. For discussion, we focus on the adjusted odds ratios where $p \leq 0.05$. Reuda-Domingo et al., also used adjusted odds ratios to study the effect of passengers on Spanish drivers. (*7*)

Several researchers used culpability analysis to study the effects of passengers because it is currently the most effective way to control for exposure, or vehicle miles traveled. (*7*), (*9*), (*10*) The number of not-at-fault drivers is a relative exposure measure of how many drivers of a particular age and sex are carrying a specific number of passengers. (*17*), (*9*) Another possible exposure measure could be data taken from the United States National Household Transportation Survey (NHTS). Trip-level data from this survey contains information on occupants’ age and sex. These weighted survey data, combined by number of trips or the mileage of trips, might serve as an approximate exposure measure for any study on the effect of passengers. However, we have not yet found a satisfactory way to calculate the overall error of a statistics that is a combination of crash data and the stratified NHTS data.

RESULTS

For drivers involved in fatal collisions from 1992 to 2002, passenger presence was associated with a decreased risk of being at-fault in a fatal collision. Figures 1 and 2 show the adjusted odds ratios for male and female drivers' risk of causing a fatal crash. Figures 3 and 4 show the adjusted odds ratios for male and female drivers' likelihood of not wearing a seat belt. Finally, figures 5 and 6 show the adjusted odds ratios for male and female drivers' likelihood of drinking and driving. Most results were significant ($p < 0.05$); some results were inconclusive ($p > 0.05$) and are indicated by black fill. In all of these figures, an aOR with a value less than 1.0 implies that passenger presence correlated with a protective effect. An aOR value greater than 1.0 implies a passenger presence correlated with increased risk.

Teenage and Young Adult Drivers (Age 15-29)

Males

Averaging over all passenger types, passengers did not strongly correlate with a protective outcome, nor an additional risk, for young male drivers age 15 to 30 (Figure 1). Male drivers age 20 to 24 with passengers were only slightly more at risk to cause a fatal collision (aOR 1.131) than solo drivers. Similarly, passengers were a small additional risk to male drivers age 25 to 29 (aOR 1.156). Averaging over all passenger types, the aOR for male teenagers was not significant. However, a detailed analysis of passenger ages shows that teenage males were more likely to cause a fatal crash when driving with other teenagers (aOR 1.214 for female teenage passengers, aOR 1.096 for male teenage passengers), and less likely to cause a fatal crash when driving with adults. For example, the aOR for teenage male drivers driving with female passengers age 35 to 44 was 0.688; with male passengers age 35 to 44, the aOR was 0.638 ($p < 0.05$).

Aside from adult passengers riding with teenage male drivers, passengers were not a protective effect for male drivers age 15 to 29. Contributing factors could include seatbelt use and alcohol use. However, averaging over all passenger ages, teenage males were slightly more likely to wear a seatbelt if a passenger were present, than if driving alone (aOR 0.882, $p < 0.05$, Figure 3). Teenage males driving with teen passengers were slightly less likely to wear a seatbelt than if driving alone (aOR 1.038, $p < 0.05$). Passenger affect on the seatbelt use of male drivers age 20-29 was negligible.

Also, male drivers age 15 to 29 accompanied by passengers at the time of a crash, were more likely to have consumed alcohol prior to the crash than solo drivers. Accompanied by passengers, male drivers age 15 to 19 were 1.172 times more likely to be under the influence and male drivers age 25 to 29 were 1.075 times more likely to be under the influence ($p < 0.05$) (Figure 5). The results of this test were inconclusive for male drivers age 20 to 24 ($p > 0.05$).

Females

Young female drivers were different from young male drivers, in that passengers with female drivers correlate with a decreased change of being at-fault in a fatal collision. The aOR for female drivers age 15 to 19 was 0.712; it was 0.872 for female drivers age 20 to 24, and 0.746 for female drivers age 25 to 29 ($p < 0.05$) (Figure 2). Despite being less likely to cause a fatal collision, female teenage drivers in were more likely to not wear seat belts, and to drink and drive, if accompanied by passengers, rather than driving alone. Female drivers age 15 to 19 were 1.080 times more likely to not have worn their seatbelt if they had passengers in the car, than if they were driving solo ($p < 0.05$) (Figure 4). Also, accompanied by passengers, female drivers age 15 to 19 were 1.389 times more likely to be under the influence ($p < 0.05$) (Figure 6). Passenger presence did not significantly alter seatbelt or alcohol use in female drivers age 20 to 29 (Figure 6).

Adult Drivers (Age 30 and Over)

Males

Male drivers age 45 and over were much less likely to be at fault in a fatal collision if they had passengers in the car, and this protective effect seems to increase with age. The adjusted odds ratios for male drivers age 45 and over range from 0.631 (70 to 74 year old males) to 0.880 (45 to 49 year old males) (Figure 1). Findings were inconclusive for male drivers age 30 to 44.

Strikingly, passenger presence correlated with an increased chance that male drivers age 50 and above wore seatbelts (Figure 3), and this protective effect seemed to increase with age. This effect was very strong, ranging from an aOR 0.3182 for male drivers age 80-84, to 0.803 for male drivers age 55-59 ($p < 0.05$). A possible explanation for this finding is that males age 50 and over came of age when seat belt use was sporadic, and are less likely to have developed a habit of seatbelt use.

For males over age 30, where the passenger/alcohol aOR was statistically significant, passenger presence was associated with a decreased risk of alcohol consumption prior to driving. For example, the passenger/alcohol aOR was 0.804 for males age 50-54 and 0.379 for males age 70-74 (Figure 5).

Females

Similar to younger female drivers, female adult drivers were less likely to be at fault in a fatal collision if they had one or more passengers in the car (Figure 2). Although overall protective effects were somewhat stronger than the effects of passengers on male drivers, with female drivers there was no obvious pattern between this effect and age. The adjusted odds ratios for being at fault in a fatal collision ranged from 0.539 for females age 65-69, to 0.761 for females age 80-84 ($p < 0.05$).

There was a positive correlation of passenger presence and seatbelt use in adult female drivers age 40 and older (Figure 4). This is the same age group for which passengers showed a surprisingly large protective effect on male seatbelt use. However, the effect was not as strong for females; the aOR ranged from 0.878 for females age 40-44, to 0.593 for females age 60 to 64 ($p < 0.05$). Probably the reason that there were no conclusive results for females age 30 to 39, is that passengers did not have a strong effect on seatbelt use for females in this age group.

Where the aOR in conclusive for adult female drivers ($p < 0.05$), passengers were correlated with a lower chance that the driver had been drinking (for example, the aOR for females 55-59 is 0.638) (Graph 6). The reason the data were inconclusive for the other age groups, is probably because passengers do not have a strong effect on alcohol use for adult female drivers.

DISCUSSION

The data analysis reviews the cases of drivers involved in fatal motor vehicle collisions in the United States from 1992 to 2002. The results attempt to answer the question of whether passenger presence played a risk factor or protective role in whether or not the driver was at fault, wearing a seatbelt, or under the influence of alcohol at the time of their fatal injury.

Results suggest that the presence of passengers had a strong correlation with risk of causing a fatal collision, either adversely (for teenage drivers driving with teen passengers) or positively (for non-teenage drivers, and for teenage drivers driving with adults). For males, the protective effect of passengers appears to increase with age. These findings control for seatbelt use, alcohol involvement, collision history, driver's license status, moving violation history, and time of collision.

Teenage females and males age 40 and under were slightly more likely to not wear a seat belt if a passenger was present. For females over age 40 and males over age 50, passenger presence correlated with an increased likelihood of seat belt use. This protective effect was stronger for male drivers than for female drivers. That passenger presence may play a large role in seatbelt use of drivers over age 50 was a surprising outcome, although this may be a cohort effect related to driving experience prior to the widespread use of seatbelts.

Also, for female teenagers and males under age 30, fatally injured drivers accompanied by passengers were more likely to have been drinking than solo drivers.

These conclusions support the findings of previous work [(*9*), (*7*)], but reveal a stronger protective effect on older drivers than previously found (*10*). However, first it is necessary to consider several potential artifacts that produce the pattern of findings.

There are several potential limitations to the findings reported here. First, there is potential error in the measurement or ascertainment of data on fatal vehicle crashes. The number of fatal crashes is fairly accurate, as all states in the United States are required to report all vehicle crashes that caused a fatality within 30 days of the collision. We do not have any information on how complete the FARS dataset is. We may have introduced a bias in our findings by excluding cases where driver and passenger age or sex were not known, or "Driver Related Factors" were not known. This bias would exist if drivers who are accompanied by passengers, or drivers who are at fault, are either more likely or less likely to have their crash details recorded by police. Also, specific states or police jurisdictions may have different recording practices that can affect low-level details such as the "Driver Related Factors" used to ascertain culpability. For these reasons, we chose a large sample size ($n = 357{,}890$) consisting of eleven years of fatal crash data from all fifty states.

Another potential factor is selection bias, or a co-dependency, on the outcome and the selection variables. For example, persons likely to cause crashes might drive alone because others will not ride with them. This selection effect would result in inflated fatality and culpability measures for solo drivers. As another example, perhaps drivers who are very social and are often accompanied by passengers are healthier and less susceptible to injury than drivers who prefer to drive alone. Future research should attempt to control for these factors, studying the social context and medical status of people who may be more likely to drive alone than with others.

Potential Mechanisms for Driver-Passenger Interaction

There are several ways in which passengers may have a direct impact on the safety of drivers, including (i) presence of a passenger, (ii) helping in tasks not related to driving, but which distract from driving, (iii) helping directly in driving-related tasks, (iv) providing distraction which may impede driving (*18*), (*19*), (*20*), (*14*), (*21*). Findings here are based on aggregated archival data that do not provide information about the characteristics or behaviors of the respective passengers. Social interaction effects might result in negative or positive impacts on safety

In the first potential mechanism for driver-passenger interaction, the mere presence of a passenger might encourage a driver to drive in a certain way. Findings here show that passenger presence is correlated with seat belt use, both negatively in the case of younger drivers and positively in the case of older drivers. For younger age groups, passenger presence is also correlated with the driver's risk of being under the influence. Social factors such as peer pressure may be the causes of these correlations. There may be other factors. For example, perhaps a parent driving a child might drive more carefully than she would if she were driving alone. Surveys and focus groups could measure drivers' perceptions about the subtle influences of passengers.

That passenger presence was correlated with a decreased risk of being at fault in a collision also suggests other possible mechanisms. Passengers might indirectly affect drivers' safety performance by offering help in non-driving tasks, such as radio and climate control. Often, passengers make cellular phone calls for their drivers, prepare snacks, or adjust non-critical dashboard controls. To quantify how this interaction influences driver safety, researchers could make naturalistic observations of drivers with and without passengers. Also, controlled experiments could compare driving outcomes, such as reaction time, when a driver (a) performs non-driving tasks while driving and (b) asks a passenger to perform the task for him so that he can attend solely to the driving task.

Direct driving assistance is the third manner in which a passenger could increase a driver's safety performance. Passengers sometimes volunteer navigation, vision, and collision-warning information. A number of research methods could address this possibility. For example, surveys of both passengers and drivers could identify how often passengers offer direct driving assistance. Naturalistic observation would also identify how passengers directly assist the driver. Naturalistic observation could also measure driving outcomes and surrogate safety measures; for example, the use of an eye-tracker could address the hypothesis that co-pilots help drivers attend to critical variables in the driving scene.

Impact on Industry and Future Research

The most important application of this research is the reminder that seatbelt use and driving under the influence persist in being issues for all age groups. Passenger presence correlates with different seatbelt use rates and DUI rates for adults up to age 34. In some cases, passenger presence correlates with an increase in seatbelt use, as seen in males and females over age 50. Although many traffic safety programs about seatbelt use and alcohol focus on teenagers, these findings remind us of the important of seatbelt and alcohol safety programs for all drivers. For example, prevention experts might especially choose to find ways to remind older drivers to use seatbelts.

In general, adults appear to be less likely to be at-fault in a fatal collision if they are accompanied by a passenger. Passengers might offer some drivers more than just a sense of responsibility. Perhaps, passengers can act as active driving assistants. Just as adult passengers have a very strong protective effect on teenagers, passengers might be able to offer protective effects for other slightly handicapped (inexperienced or physically handicapped) older adult drivers. For example, research should explore whether drivers with limited fields of view or cognition could be considered for a restricted license that requires the presence of one additional adult driver as a passenger. This license restriction would be similar to the learner's permit available to new drivers and may have the potential to increase the safe mobility choices available to elderly adults, especially elderly domestic partners. Otherwise, new technology might automate the driving assistance tasks performed by passengers. If the co-pilot assistance of passengers is replaceable by automated technology, the crash risk involvement and culpability of solo drivers might decrease.

This study also has implications for the study of distractions and the possibility of programs to train passengers to be co-pilots for new or otherwise handicapped drivers. As a distraction, passengers are very different from cell phones, music, radio, and perhaps pets traveling in vehicles. Though in-vehicle auditory stimuli may in general be distracting, perhaps a small amount of "distraction" from passengers might help the driver to focus on the driving task. A driver with alert passengers might not only feel a stronger sense of responsibility, but also may be more self-conscious about his driving abilities being discretely evaluated by the passenger. To distinguish between these two possibilities would help crash prevention programs to tailor appropriate in-vehicle driver stimuli. An important issue is the possibility that patterns of social interaction might be different for teen drivers with passengers than elderly drivers with passengers. By researching how passengers reduce drivers' crash risk, prevention programs could effectively train passengers to be co-pilots for new, handicapped, or elderly drivers.

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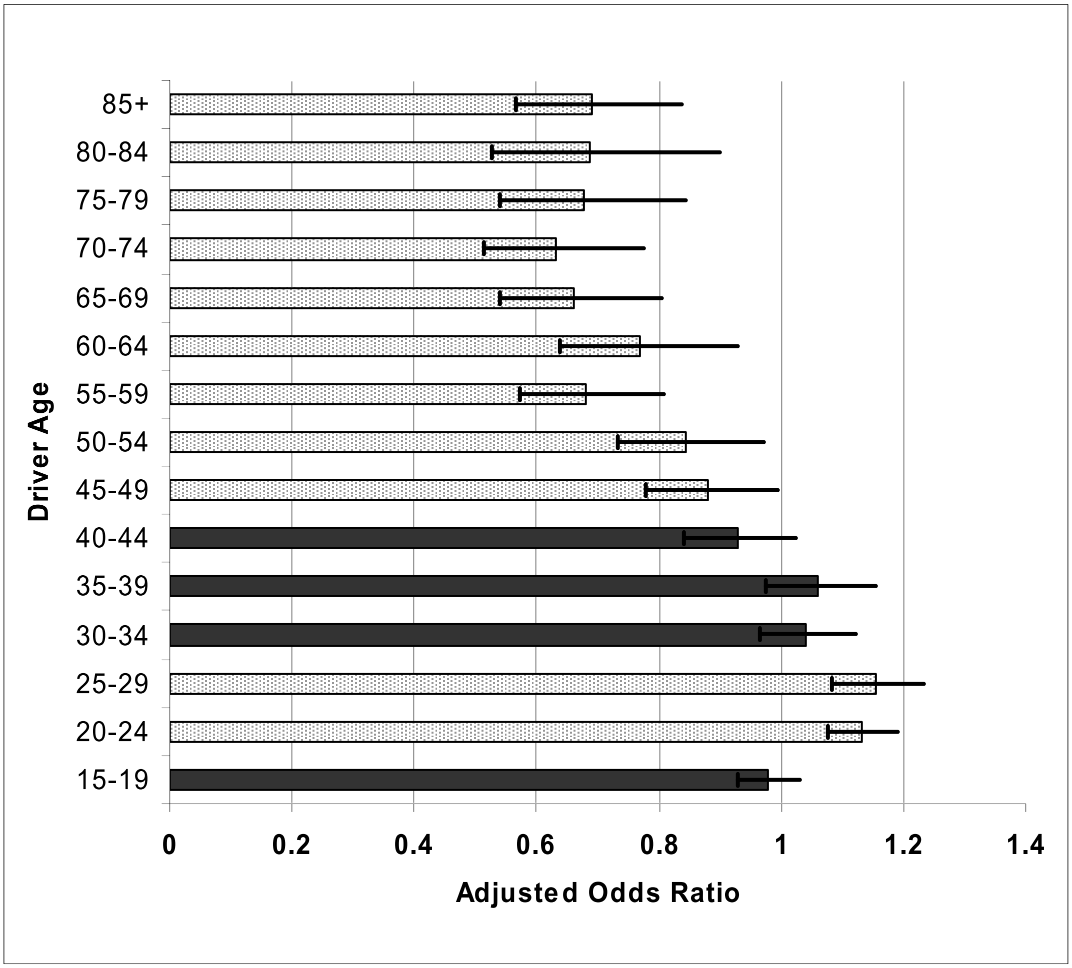
TABLE 1
Example Odds Ratio Table

Female Drivers, Age 20-24, Daytime Collisions, Driver Had No Alcohol, Seatbelt Used, No Previous Collisions, No Previous DUI Offenses, Existing Previous Non-Speeding Moving Violations, Existing Speeding Violations, No Previous License Suspension

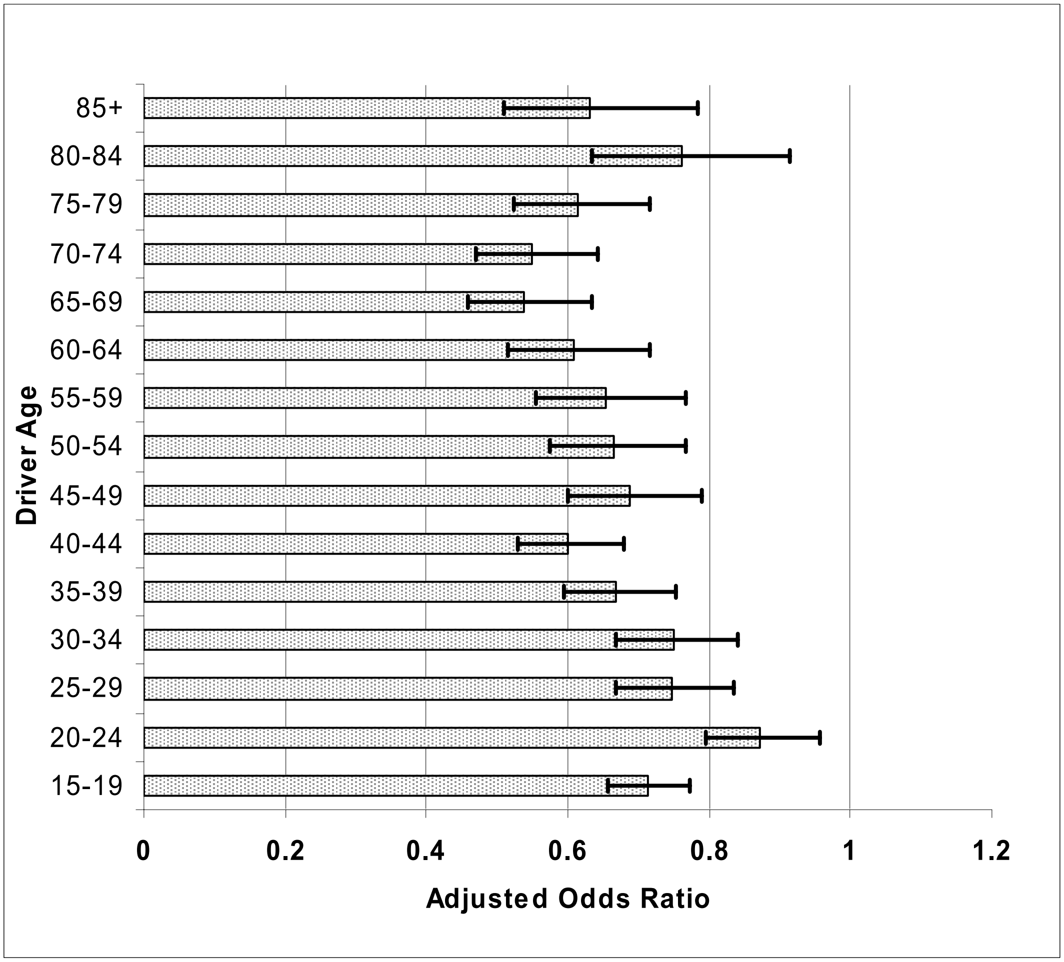
	Drivers Not at Fault	Drivers at Fault
Solo Drivers	29	25
Drivers Accompanied by Passengers	12	10

GRAPH 1
Association Between Vehicle Occupancy and Male Driver's Likelihood of Causing a Fatal Collision*



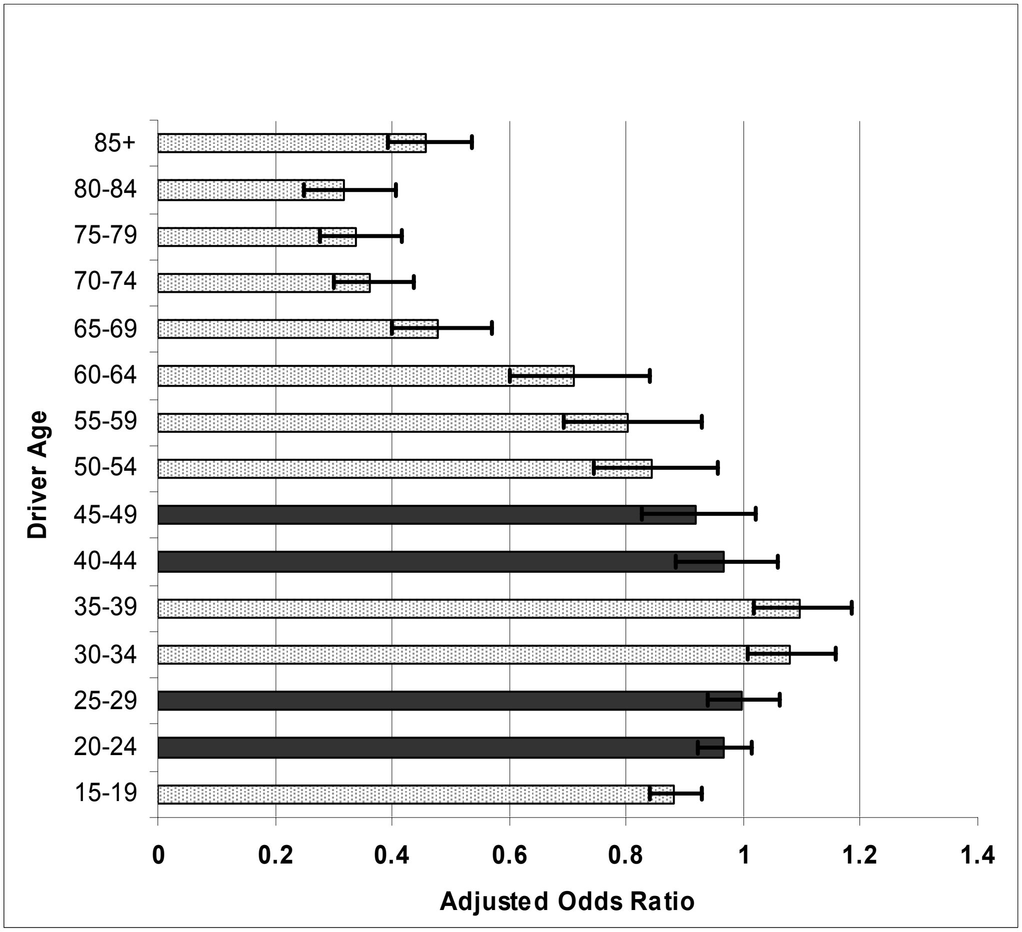
*95% confidence levels indicated. Gray-fill indicates $p < 0.05$; black-fill indicates $p > 0.05$. aOR < 1.0 indicates "protective effect" of passengers; aOR > 1.0 indicates high risk associated with passenger presence.

GRAPH 2
Association Between Vehicle Occupancy and Female Driver's Likelihood of Causing a Fatal Collision*



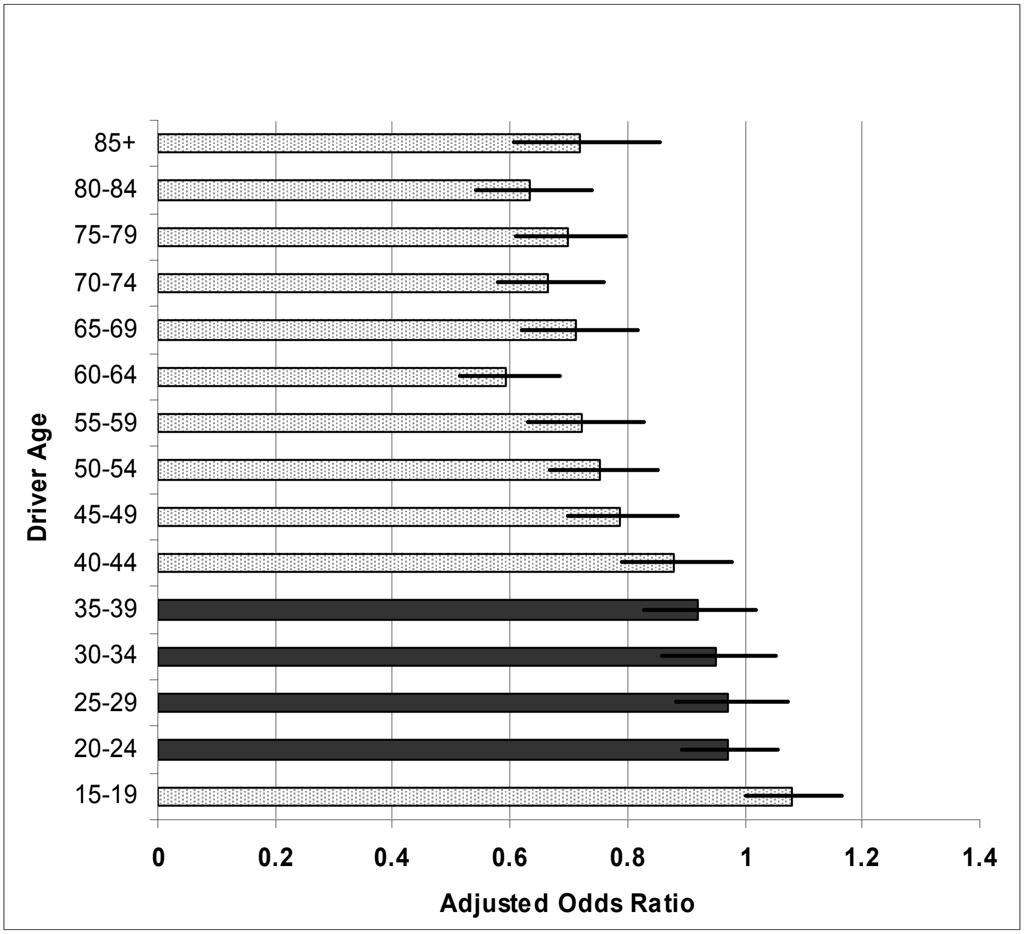
*95% confidence levels indicated. Gray-fill indicates $p < 0.05$; black-fill indicates $p > 0.05$. aOR < 1.0 indicates “protective effect” of passengers; aOR > 1.0 indicates high risk associated with passenger presence.

FIGURE 3
Association Between Vehicle Occupancy and Male Driver Seatbelt Use*



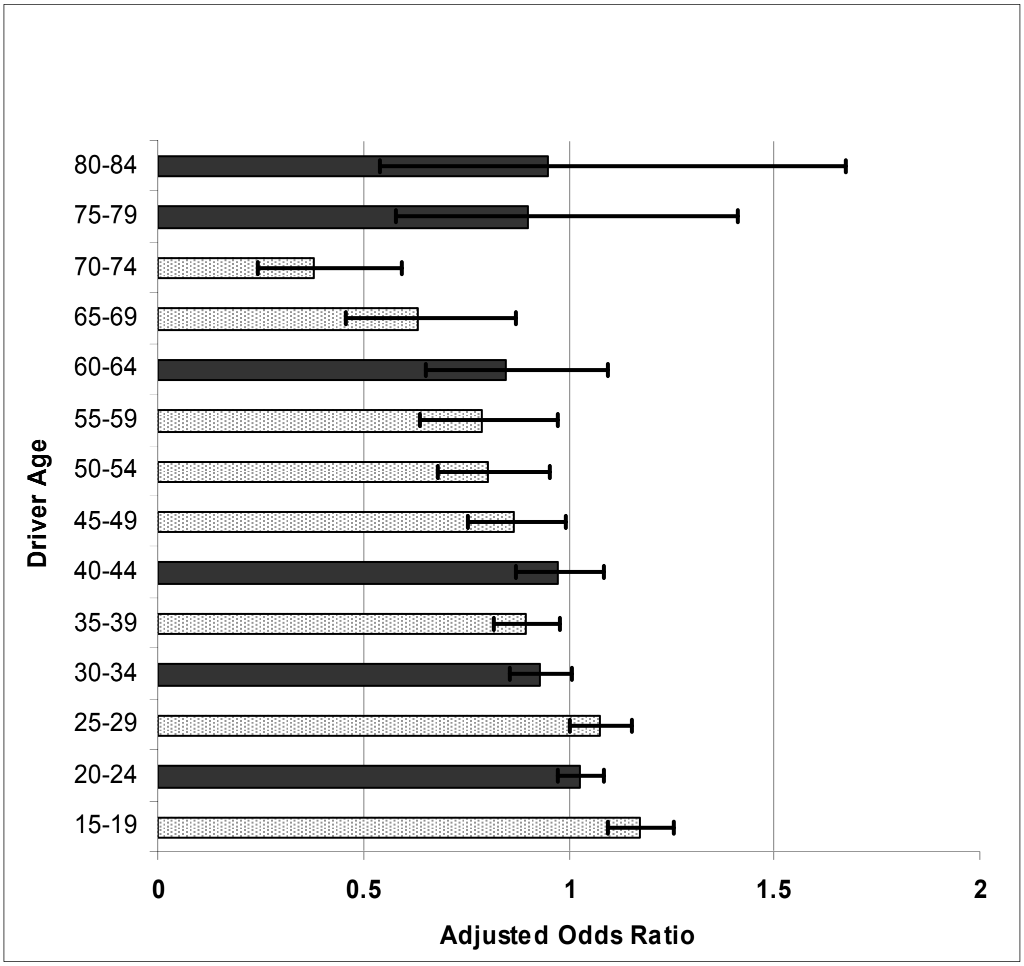
*95% confidence levels indicated. Gray-fill indicates $p < 0.05$; black-fill indicates $p > 0.05$. aOR < 1.0 indicates "protective effect" of passengers; aOR > 1.0 indicates high risk associated with passenger presence.

FIGURE 4
Association Between Vehicle Occupancy and Female Driver Seatbelt Use*



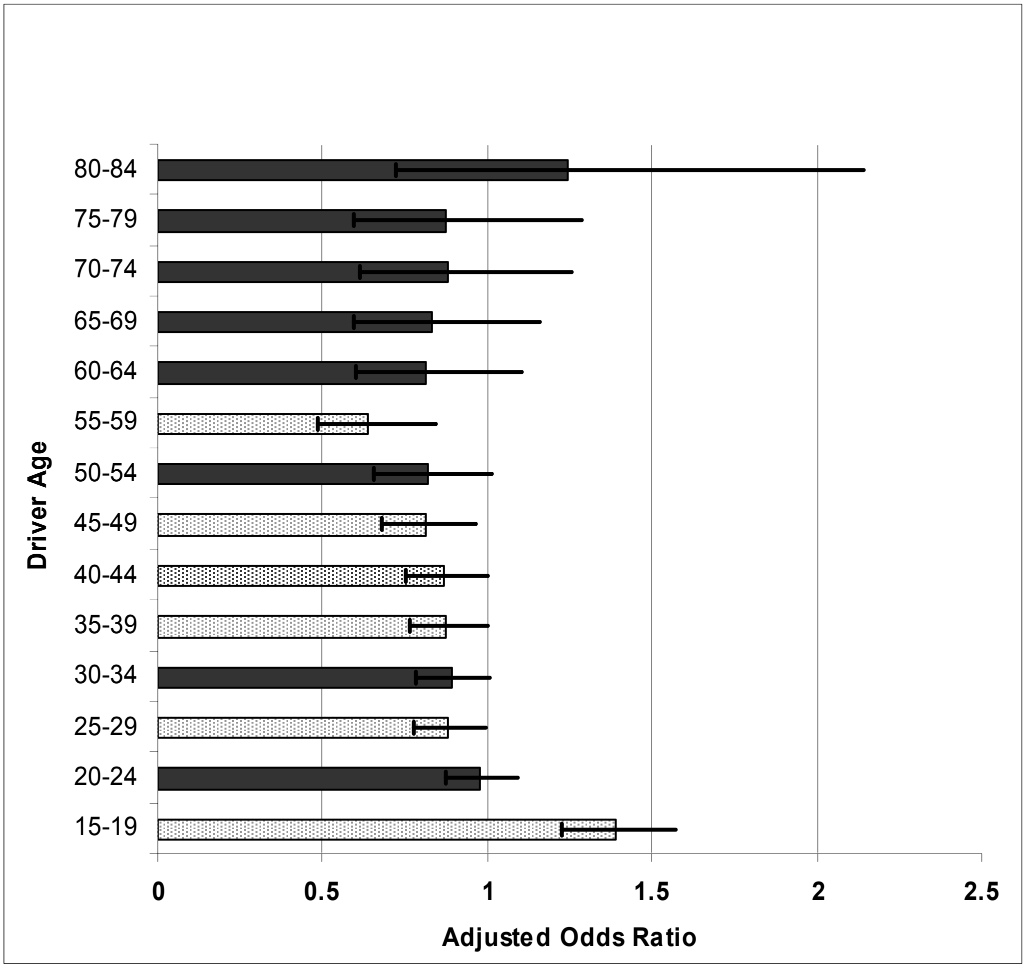
*95% confidence levels indicated. Gray-fill indicates $p < 0.05$; black-fill indicates $p > 0.05$. aOR < 1.0 indicates "protective effect" of passengers; aOR > 1.0 indicates high risk associated with passenger presence.

FIGURE 5
Association Between Vehicle Occupancy and Male Driver Alcohol Use*



*95% confidence levels indicated. Gray-fill indicates $p < 0.05$; black-fill indicates $p > 0.05$. aOR < 1.0 indicates "protective effect" of passengers; aOR > 1.0 indicates high risk associated with passenger presence.

FIGURE 6
Association Between Vehicle Occupancy and Female Driver Alcohol Use*



*95% confidence levels indicated. Gray-fill indicates $p < 0.05$; black-fill indicates $p > 0.05$. aOR < 1.0 indicates "protective effect" of passengers; aOR > 1.0 indicates high risk associated with passenger presence.