



## STATE OF KNOWLEDGE: FEMALE DRUNK DRIVERS



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## The Traffic Injury Research Foundation

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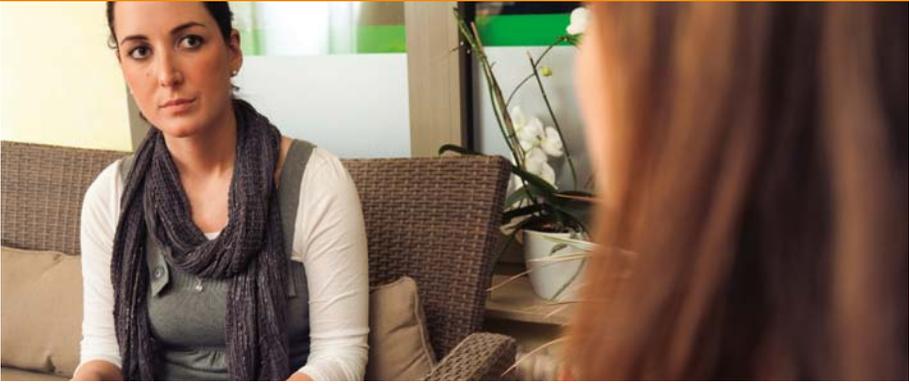
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## EXECUTIVE SUMMARY

### Purpose and objectives

- > The purpose of this report is to provide a current state of knowledge about drunk driving among female drivers. Its objectives are to describe the magnitude of the female drunk driver problem, the characteristics of these offenders, the current involvement of female drivers testing positive for alcohol in fatal crashes, and effective strategies that are available and being applied to manage this population.
- > Research ranging from the 1980s through to present day is reviewed in chronological order in Section 3 (Magnitude of the Problem) and Section 4 (Characteristics of Offenders) to provide a complete perspective on this problem and also a sense of how it has evolved over time. This approach is useful to explore claims that the problem has grown in recent years. However, it is important to keep in mind that some of the studies described in this report were conducted more than two decades ago. As such, those findings stemming from much older studies should be interpreted with caution as they may or may not still be applicable today. Similarly, studies also utilized different blood/breath alcohol concentration (BAC) ranges and age ranges (particularly for young drivers) which make comparisons difficult at times.
- > It is further important to note that terminology used to describe the drunk driving issue has also evolved in the traffic safety field, particularly in the last decade. Historically, terms such as alcohol-related, impaired driving, drunk driving, and drinking and driving were often used interchangeably.

However, in the past decade, there has been a much clearer distinction drawn between these terms which are understood to mean different things. Generally speaking these terms mean the following:

- » Alcohol-related crashes refers to any crashes (including those involving pedestrians and cyclists) involving any level of alcohol;
  - » Alcohol impaired crashes refers to crashes involving a driver with a BAC over the per se BAC limit of .08;
  - » Alcohol impaired driving means driving with a BAC over the per se BAC limit of .08 or otherwise meeting the legal impairment threshold for a criminal conviction;
  - » Alcohol positive drivers means drivers who have consumed alcohol but who may not reach the per se BAC limit of .08 or a legal threshold for impairment;
  - » Drunk driving refers to a criminal offense (either over the per se BAC limit of .08 or impaired as defined by impairment-based statutes);
  - » Drinking and driving refers to driving after consuming any amount of alcohol; and,
  - » DWI<sup>1</sup> means driving while intoxicated or driving while impaired and is used as a general term to refer to criminal offenses for drunk driving across the United States (U.S.) although terms used in specific states may vary.
- > As such, the authors of this report have utilized these terms as described above wherever possible. However, in reference to a few studies or to some older studies where the meaning of these terms is not well-defined, the authors of this report have relied upon the terms specifically utilized by the authors of the cited studies for consistency purposes. Hence, results should be interpreted with this caveat in mind.

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1 The abbreviation DWI (driving while intoxicated or impaired) is used throughout this report as a convenient descriptive label, even though some states use other terms such as OUI (operating under the influence) or DUI (driving under the influence), and in some states they refer to different levels of severity of the offense. We have used DWI not only to maintain consistency throughout the report but also because it is more descriptive of the offense usually associated with drunk drivers.

## Introduction

- For several decades, road safety research has demonstrated that fatalities and injuries related to road crashes (due to alcohol or other unsafe driving behaviors) have predominantly involved males<sup>2</sup>. Similarly, drunk driving has also predominantly been considered a male based problem<sup>3</sup>. To illustrate, men and young adults are more likely than women or older age groups of drivers to self-report drinking and driving behavior, to be arrested for DWI, or to be fatally injured or to fatally injure others while driving drunk<sup>4</sup>.
- In the past three decades, attention to female involvement in drunk driving events has grown. This interest has become more pronounced as a result of increases in female involvement in DWI arrests and incremental increases in alcohol impaired crashes in the past decade<sup>5</sup>.
- Since the increase in female drunk driving behavior first garnered attention in the late 1980s<sup>6</sup>, there have been three main hypotheses regarding factors associated with this phenomenon. These explanations center on changes in female roles in society<sup>7</sup>, changes in social norms<sup>8</sup>, and changes in social control mechanisms<sup>9</sup>.
- Regardless of the reason why this growth in the female drunk driver problem has occurred, there is hard data illustrating the growing prevalence of female arrests for DWI and, to a lesser extent, incremental increases in female drivers testing positive for alcohol in fatal crashes in a small number of jurisdictions<sup>10</sup>.

## Magnitude of the problem

- Generally speaking, women consistently self-report that they drive after drinking less frequently than men<sup>11</sup>. However, available self-report data on female drinking and driving behavior is mixed.

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2 Mayhew et al. 1981; Beirness 1988; Mayhew and Simpson 1990; Mayhew et al. 1990; Kelley-Baker and Romano 2010.

3 Waller 1997; Simpson and Mayhew 1991; Jones and Lacey 2001.

4 Mayhew et al. 2003; Zador et al. 2000.

5 Robertson et al. 2011; Tsai et al. 2010; FBI 2008.

6 Underhill 1986; Argeriou 1986.

7 Popkin 1991; Bergdahl 1999; Mayhew et al. 2003; Robertson et al. 2011; Tsai et al. 2008.

8 Gudrais 2011; Popkin 1991.

9 Farrow and Brissing 1990; Robertson et al. 2011; Schwartz and Rookey 2008; Schwartz and Steffensmeier 2007.

10 Robertson et al. 2011; Tsai et al. 2010; FBI 2008.

11 Marelich et al. 2000.

- Despite differences in survey methodologies and variations in age groups and BAC levels studied, it is apparent that a relatively small percentage of females self-report drinking and driving (10-20%) and this percentage has been stable for many years<sup>12</sup>.
- DWI arrests are the largest category of alcohol-related crimes that bring women into contact with the criminal justice system<sup>13</sup>. There is growing data that suggest that DWI arrests for women have risen nationally, and especially in some jurisdictions<sup>14</sup>.
- In 1980, just 9% of those arrested for DWI were female with the percentage rising to nearly 15% by 1996 and 20% by 2004. The number of female DWI arrests has risen nationally by 28.8% between 1998 and 2007<sup>15</sup>.
- Several explanations for the growth in female DWI arrests have been proposed. Some have suggested that the increase in arrests reflects a real trend of growing female involvement in drinking and driving; others have postulated that dramatic reductions in arrests among males have skewed the perception of female involvement in arrests. Still others have argued that changes in legal policy and enforcement practices have resulted in the greater likelihood that law enforcement will detect and arrest female drunk drivers. Some have further suggested that these legal and enforcement changes have brought more attention to women who tend to be more impaired at lower BACs due to physiological differences between males and females<sup>16</sup>.
- Data regarding the level of convictions of females for drunk driving offenses is sparse, but there is some indication that it may also be increasing incrementally. The percentage of females in jail for drunk driving has grown incrementally since 1983 when they accounted for just 5% of those in jail for DWI as compared to 1996 when women accounted for 7%<sup>17</sup>. More recent data are unavailable.

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12 Drew et al. 2010; Royal 2003; Schwartz and Rookey 2008; Wilsnack et al. 1984.

13 Parks et al. 1996.

14 NHTSA 2009a; Schwartz and Steffensmeier 2007.

15 Lapham et al. 2000; Schwartz and Rookey 2008.

16 Dawson et al. 1995; Wells-Parker et al. 1996; NIAAA 1997.

17 Maruschak 1999.

- > U.S. road fatality data from the Fatality Analysis Reporting System (FARS) demonstrate that the trend in female driver involvement in alcohol impaired driving crashes (which involve a driver or motorcycle rider with a BAC of .08 or greater) has remained fairly stable during the past three decades with only incremental increases.
- > According to a study of female DWI arrests by Schwartz and Rookey (2008), an analysis of FARS data to examine legally drunk female drivers in fatal crashes revealed that the percent of female drunk drivers averaged 12% in the 1980s, 13% in the 1990s, and 14% in the 2000s. They further argue that the incremental increases in female drunk drivers in crashes is due to sharper declines in male compared to female rates of DWI from the 1980s to the 1990s. They further note that the gender composition in relation to arrests and crash data is highly similar until the late 1990s, at which point the portion of female arrestees far surpasses their share of legally drunk drivers.<sup>18</sup>
- > Even more recently, TIRF's analysis of FARS data from all U.S. jurisdictions between 2005 and 2009 reveals that the total number of female drivers who tested positive for any amount of alcohol in fatal crashes has generally declined during this period. Similarly, the percentage of female drivers who tested positive for any amount of alcohol in fatal crashes has also declined from 18% to 16%.
- > Although increases in the number or percent of females testing positive for alcohol in fatal crashes have been recorded in a small number of jurisdictions, these increases should be considered in the context of the overall stable trend in the past five years.
- > Recent FARS data from 2008 reveal that 1,837 fatalities in crashes involved an alcohol impaired female driver<sup>19</sup>.

## Characteristics of female offenders

- > For the most part, the profile of a female drunk driving offender differs somewhat from that of a male drunk driving offender, yet they also share some common characteristics.

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<sup>18</sup> Schwartz and Rookey 2008.

<sup>19</sup> NHTSA 2009a.

- Studies demonstrate that a substantial proportion of female drunk drivers are experiencing alcohol problems, and that the gravity and complexity of those problems is not insignificant<sup>20</sup>. As evidence of this, a five year follow-up study of convicted DWI offenders in New Mexico revealed that 85% of female offenders (compared to 91% of male offenders) were diagnosed with either alcohol abuse or alcohol dependence<sup>21</sup>.
- A Texas study examining the characteristics of DWI offenders in treatment found that females were most likely to be diagnosed with a primary problem with sedatives or opiates, whereas males were most likely to be diagnosed with a primary problem with alcohol and cannabis<sup>22</sup>.
- In general, women are different from men in regard to the development of substance abuse and related problems. Females tend to develop substance abuse problems when they are older and they also tend to develop them faster than men<sup>23</sup>.
- Among female DWI offenders in treatment in Texas, one of the strongest predictors of not being abstinent at a 60-day follow-up from treatment is living with someone who had a substance abuse problem<sup>24</sup>.
- The average age of female first DWI offenders is 31 and the average age of recidivists is 30, although this fact is drawn from older research<sup>25</sup>. Generally, rates of involvement in alcohol impaired motor vehicle crashes decrease with age, and the population of greatest concern is often young females<sup>26</sup>. In particular, the increasing involvement of young women with alcohol, in combination with their inexperience driving and their growing propensity for risky driving<sup>27</sup> warrants our attention and further research.
- Findings in the literature regarding levels of education and employment among female drunk drivers are mixed. However, female drunk drivers are generally older than men and have higher levels of education<sup>28</sup> but lower paying jobs<sup>29</sup>.

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20 White and Hennessey 2006.

21 Lapham et al. 2001.

22 Maxwell 2011.

23 Green 2006.

24 Maxwell and Freeman 2007.

25 Shore and McCoy 1987.

26 Peck et al. 2008.

27 Lynskey et al. 2007; Tsai et al. 2010.

28 Peck et al. 2008.

29 Chalmers et al. 1993; Shore and McCoy 1987.

- > A significant proportion of female drunk drivers is single, divorced or separated, or is more likely to be living with a partner with an alcohol problem<sup>30</sup>.
- > Findings indicate that there is a need to treat a not insignificant part of the female drunk driver population, not only for alcohol misuse problems, but also mental health problems<sup>31</sup>. Female DWI offenders have significantly higher psychiatric co-morbidity relative to their male counterparts<sup>32</sup>. Diagnoses of anxiety, depression, and post-traumatic stress disorder (PTSD) are common among female drunk driving offenders. The use of drugs also appears to be more prevalent among female DWI offenders<sup>33</sup>.
- > Research also shows that when female and male offenders in treatment return to an environment that lacks sources of support, they will likely repeat their pattern of alcohol and/or drug abuse<sup>34</sup>.
- > A constellation of family factors are associated with female DWI offending to varying extents, however, the specific influence of each factor is unclear. Many female DWI offenders who were admitted to addiction treatment had multiple factors that contributed to their alcohol consumption including a history of alcoholism within the family, experience with abuse, anxiety and depression, and family and personal relationships that encouraged heavy drinking<sup>35</sup>.
- > Findings regarding recidivism among female drunk drivers as compared to males are somewhat consistent. Available data suggest recidivism risk may be higher for young males than women<sup>36</sup>, but it appears that risk of recidivism may converge as adults of both genders age<sup>37</sup>. Few studies have been conducted to examine this issue and more research is needed.
- > A study in 2000 involving a five year follow-up of 2,615 convicted first DWI offenders in New Mexico revealed that overall 26% of offenders had been re-arrested (20% of females and 33% of males<sup>38</sup>). The study further reported that, after controlling for a range of factors, young males had a

30 McMurrin et al. 2011; Chang et al. 1996; Shore and McCoy 1987; Argeriou et al. 1986.

31 McMurrin et al. 2011.

32 Laplante et al. 2008.

33 Maxwell and Freeman 2007; SAMHSA 2005.

34 Maxwell and Freeman 2007.

35 White and Hennessey 2006.

36 Argeriou et al. 1986; Jones and Lacey 2001; McMurrin et al. 2011; Webster et al. 2009; Wells-Parker et al. 1991.

37 Lapham et al. 2000.

38 Lapham et al. 2000.

recidivism rate 2.5 times that of women. However, a comparison of rates among older offenders revealed few differences between genders<sup>39</sup>.

- A more recent study (2010) in Maryland, reported that, following their first conviction for drunk driving offenses, the risk of recidivism is as pronounced among female offenders as it is among male offenders. The study also noted that on average, drivers with repeat alcohol offenses (as measured by violations on their driving record) were younger than drivers who did not have repeat alcohol offenses on their driving record<sup>40</sup>.
- Female DWI recidivists often share similar characteristics to their male counterparts with minor differences<sup>41</sup>. For example, repeat female DWI offenders have higher levels of psychiatric co-morbidity than male repeat offenders and are more likely to also use drugs<sup>42</sup>.
- There is limited data to suggest that a smaller number of female first DWI offenders (relative to male first DWI offenders) have a history of other traffic offenses or criminal offenses, although more research into this topic is needed. Common criminal offenses may include drug offenses, theft offenses, and assault<sup>43</sup>.
- Generally speaking, all female offenders, including DWI offenders, are more likely to be the primary caretaker of children at the time of arrest, more likely to have experienced abuse, and more likely to have physical and mental health needs<sup>44</sup>.

## Involvement of female alcohol positive drivers in fatal crashes

- The characteristics of fatal crashes involving female drivers testing positive for alcohol were investigated using the National Highway Traffic Safety Administration's (NHTSA) FARS data<sup>45</sup>.
- National results revealed that in general, the profile of male alcohol positive drivers in fatal crashes resembles that of female alcohol positive drivers in fatal crashes. However, male drivers testing positive for alcohol

39 Laplante et al. 2008.

40 Rauch et al. 2010.

41 Argeriou et al. 1986.

42 Laplante et al. 2008; Maxwell 2011.

43 Caldwell-Aden et al. 2009.

44 Bloom et al. 2003.

45 <http://www-fars.nhtsa.dot.gov/>.

were more often considered by police to be using drugs, to be speeding, to not be properly licensed at the time of the fatal crash, and more often had previous other convictions and previous license suspensions compared to female drivers testing positive for alcohol.

- When comparing different BAC levels, the higher the BAC level of a female driver in a fatal crash, the more likely it is the driver was involved in a single vehicle crash. Likewise, the higher the BAC level of a female driver in a fatal crash, the more likely it is that they were not wearing a seatbelt or helmet and that the driver was considered by police to have been using drugs. As BAC levels rise from below .08 to above .08, the more likely it is for a female driver to be between the age of 21 and 34. With regards to speeding and not having a valid license at the time of the fatal crash, the higher the BAC of the female driver in the fatal crash, the more likely it is the driver was considered by police to have been speeding or that the driver did not have a valid license. The same patterns were noted for males.
- For females who had been previously convicted of DWI on one or more occasions, as BAC levels of drivers increase to higher levels, the more likely it is that the driver had a previous DWI conviction. The same was true for previous license suspensions. Finally, as levels of BAC among female drivers increase, the more likely it is that the fatal collision occurred at night (9:00pm-5:59am). The same patterns were noted for males.
- The crash characteristics of female drivers testing positive for alcohol in fatal crashes were also examined from one state for each of the U.S. Census Bureau divisions: Midwest – Ohio (OH), Northeast – New Jersey (NJ), West/South – Texas (TX) and South – Florida (FL). In terms of crash characteristics, the profile of female drivers in fatal crashes who tested positive for alcohol in each of these states is largely consistent with the national profile.

## Effective programs and practices

- With regards to effective programs and practices, little is known about the effectiveness of programs and interventions for women convicted of drunk driving offenses. However, there is some evidence of differences between women and men's alcohol-related offending, their respective

needs, and treatment outcomes that can inform the development of interventions targeted towards this population<sup>46</sup>.

- Due to the more rapid progression of alcohol dependence, women often require medical intervention an average of four years earlier than males who are problem drinkers<sup>47</sup>.
- Women may experience different barriers in relation to initiating and completing treatment for a substance abuse disorder as compared to men, including lack of transportation and childcare<sup>48</sup>.
- Data illustrate that a significant number of female DWI offenders participate in a wide range of drunk driving programs and interventions. Anecdotal data indicate that women comprise between 15% and 25% of traditional drunk driving programs such as alcohol monitoring and DWI courts. However, there is little research to date to demonstrate the effectiveness of these approaches with female drunk drivers relative to male drunk drivers. One systematic review of interventions for alcohol-related offending by women found that interventions that increase women's negative emotions may increase their risk of recidivism<sup>49</sup>.
- Once in treatment, there is little difference between males and females generally in terms of effectiveness and this goes for different measures of effectiveness including program retention, completion, and outcomes<sup>50</sup>.
- A review of studies examining substance abusing women in treatment found that certain characteristics are associated with better outcomes in terms of treatment retention and completion for both men and women. These characteristics include lower levels of psychiatric symptoms, higher income, being employed, having higher levels of education, and social supports, as well as having personal and social stability<sup>51</sup>. However, many of these predictors vary by gender and have been found to be associated with women's retention in substance abuse treatment. For example, the prevalence of co-occurring disorders among females with substance use disorders is higher than that of males and this has been shown to have a negative impact on treatment retention<sup>52</sup>.

46 McMurrin et al. 2011.

47 Gudrais 2011.

48 Green 2006.

49 McMurrin et al. 2011.

50 Greenfield et al. 2007.

51 Greenfield et al. 2007.

52 Greenfield et al. 2007.

- > Programs which address the needs of different sub-groups of female offenders may be more beneficial than gender-specific programs alone<sup>53</sup>.
- > In terms of treatment for substance abusing women in general, gender-specific treatment has been recommended. It has been found that single-gender treatment (i.e., women only) may be perceived more positively than mixed-gender treatment<sup>54</sup>. Thus, women-only programs should be made available when possible, and when not, the option of women-only groups should be offered<sup>55</sup>. It is still unknown however, which aspects of women-only programs actually affect positive outcomes.
- > In terms of features of effective programs, access to substance abuse treatment could be enhanced by providing childcare and family services to women, as well as transportation<sup>56</sup>.
- > To ensure the proper care of the individual seeking help, treatment needs to be customized to the client and should address each person's particular needs<sup>57</sup>.
- > Individual counseling should be additionally offered to women when possible<sup>58</sup>.
- > More research about what works with female drunk drivers in relation to the effectiveness of traditional sanctions is needed. Similarly, it still must be determined what particular components of treatment produce better outcomes and what specific features contribute to change<sup>59</sup>.

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53 Tsai et al. 2010.

54 Greenfield et al. 2007.

55 Grella and Greenwell 2004.

56 Sun 2006.

57 Freeman et al. 2011.

58 Sun 2006.

59 Sun 2006.



# 1. INTRODUCTION

In 2009, 10,839 deaths in the United States (U.S.) occurred due to alcohol impaired motor vehicle crashes (NHTSA 2009b), accounting for almost one-third (32%) of all motor vehicle fatalities involving a driver with a blood/breath alcohol concentration (BAC) of .08 or higher. Despite significant progress since the 1980s in reducing drunk driving, efforts stalled for about a decade and, only recently, have further declines been achieved. As of 2006, there has been a continued trend in the reduction in alcohol impaired fatalities. Steady declines have been achieved with 13,491 alcohol impaired driving motor vehicle deaths in 2006; 12,998 deaths in 2007, 11,773 deaths in 2008, and 10,839 deaths in 2009 (NHTSA 2008; NHTSA 2009c; NHTSA 2010). However, the number of deaths related to drunk driving remains unacceptably high and more work is needed to reduce this number.

For several decades, road safety research has demonstrated that fatalities and injuries related to road crashes (due to alcohol or other unsafe driving behaviors) have predominantly involved males. Their involvement in risky driving and fatal crashes has been repeatedly demonstrated (Mayhew et al. 1981; Beirness 1988; Mayhew and Simpson 1990; Mayhew et al. 1990; Kelley-Baker and Romano 2010). Not surprisingly, it is generally acknowledged that males, and particularly young males, drive more frequently (Mayhew et al. 2003) and are also more likely to be involved in high-risk activities such as speeding and aggressive driving, running red lights or stop signs, as well as non-use of seatbelts (NHTSA 1998; Shinar and Compton 2004).

Similarly, drunk driving has also predominantly been considered a male-based problem (Waller 1997; Simpson and Mayhew 1991; Jones and Lacey 2001). Research has repeatedly shown that the vast majority of driving while intoxicated or driving while impaired (DWI<sup>1</sup>) offenders are male and that men account for a disproportionate share of the drunk driver population (Moore 1994; Burgess and Lindsey 1997; Schwartz and Rookey 2008). To illustrate, men and young adults are more likely than women or older age groups to self-report drinking and driving behavior, to be arrested for DWI, or to be fatally injured or to fatally injure others while driving drunk (Mayhew et al. 2003; Zador et al. 2000).

While the involvement of females in road crashes generally, and drunk driving events specifically, has been much less pronounced relative to males (Schwartz and Rookey 2008), increases in the rate of female drinking drivers have been reported across North America as well as in Finland, Sweden, Germany, and New Zealand (Waller 1997).

In the past decade, some research has documented increases in DWI arrests as well as incremental increases in female involvement in alcohol impaired crashes (Robertson et al. 2011). For example, the number of female DWI arrests in the U.S. increased from 126,119 in 1998 to 162,493 in 2007 (U.S. DOJ 2008). The crash rates of female drivers aged 19-24 who were alcohol positive in fatal crashes also increased between 1995 and 2007 (Tsai et al. 2010). Similar trends have been noted in other studies that have examined DWI conviction rates or rates of women entering court-referred DWI remediation programs (Wells-Parker et al. 1993; Maxwell and Freeman 2007; Robertson et al. 2011).

In addition, according to the National Highway Traffic Safety Administration (NHTSA) in 2008, 1,837 fatalities involved an alcohol impaired female driver (NHTSA 2009a). While the percentage of females testing positive for alcohol in fatal crashes is stable nationally, it has been reported that ten states reported increases in the number of alcohol impaired female drivers in fatal crashes and five states reported no change despite an overall decline of 9% in the number of alcohol impaired drivers nationwide from 2007 to 2008

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1 The abbreviation DWI (driving while intoxicated or impaired) is used throughout this report as a convenient descriptive label, even though some states use other terms such as OUI (operating under the influence) or DUI (driving under the influence), and in some states they refer to different levels of severity of the offense. We have used DWI not only to maintain consistency throughout the report but also because it is more descriptive of the offense usually associated with drunk drivers.

(NHTSA 2009a). These increases in a few states should be considered in the context of the overall stable trend nationally in the past five years.

Since the increase in female DWI behavior first garnered attention in the late 1980s (Underhill 1986; Argeriou 1986), there have been three main hypotheses regarding factors associated with this phenomenon. These explanations center on changes in female roles in society, changes in social norms, and changes in social control mechanisms. These are briefly described below.

First, it has been suggested that the role of women in society has evolved in the past 30 years and that such changes have influenced female driving behaviors (Popkin 1991; Bergdahl 1999; Mayhew et al. 2003; Tsai et al. 2008; Robertson et al. 2011). Evidence of the changes in social roles have been demonstrated by the large influx of female workers in the labor force which is believed to have contributed to the more frequent use of vehicles and the driving of longer distances by women than occurred historically. To illustrate, research shows that the number of women who travel for business tripled between 1977 and 1995 (Mayhew et al. 2003).

In addition, it has been demonstrated that women today are more likely than their older counterparts to possess a driver's license, to drive more miles, to drive during nights and weekends when crashes are more likely to occur, to be the driver of the vehicle, and, even to drive more aggressively (Hu and Reuscher 2004; IIHS 2001). Results of the national roadside survey of alcohol impaired driving across the U.S have shown an increase in the percentage of women driving on weekend evenings from 16.5% in 1973 to 25.5% in 1986 to 30.6% in 1996 and finally 37.1% in 2007 (Lacey et al. 2009). More generally, it has further been suggested that women have engaged in more high-risk driving activities as a result of changing social norms (Elliott et al. 2006).

Another explanation relates to changes in social norms that have made it more acceptable for women to consume alcohol, either in public or at home (Gudrais 2011). In the 1960s through to the 1980s, alcohol consumption patterns remained relatively stable and overall, there was no evidence of converging alcohol use patterns between males and females. However, a small increase has been noted in the proportion of men abstaining from alcohol as well as a decrease in younger female abstainers during the 1980s. Moreover, there was an increase in heavy drinkers in their 20s for both

men and women during the 1980s (U.S. Department of Health and Human Services 1990). Generally, women are less often associated with alcohol consumption. However, among certain females, this has changed, and it has become more socially acceptable for women to drink than it had once been (Popkin 1991). A U.S. study by Mercer and Khavari (1990) reported that women significantly increased their consumption of beer between 1977 and 1985; it further reported that during this period, the rate of females abstaining from alcohol decreased.

Of interest, young women now consume their first alcoholic drink at an increasingly younger age that is more comparable to men (Gudrais 2011). This finding is supported by older research that demonstrated that the percent of women who began to use alcohol during their teens became comparable to that of males (Brady and Randall 1999), and that differences in alcohol use and heavy drinking among males and females in high school and college have declined since 1975 (Johnson et al. 1998). More recently, data from the National Survey on Drug Use and Health (NSDUH) about alcohol use in the last month among persons aged 12 to 20 show that percentages for males and females were similar with 28.8% of females and reporting alcohol use in the last month in 2002 and decreasing to 26.3% in 2010. For males, the percentage reporting alcohol use in the last month was 29.6% in 2002 decreasing to 28.3% in 2010 (SAMHSA 2011).

Similar findings have been noted for drugs. With regards to adolescent drug use, the NSDUH has found that in 2002, 2003 and 2004 the number of new marijuana users between the ages of 12 and 17 was higher for females than males. Further, in 2004 more girls started using alcohol and cigarettes compared to boys (Office of National Drug Control Policy 2006). More recently, NSDUH data on self-reported drug use among 12 to 17 year olds in the last month show that the percentage of females who reported using marijuana and hashish in the last month was 7.2% in 2002, reached a low of 5.8% in 2007 and increased to 6.4% in 2010. For males, the percentage reporting using marijuana and hashish in the last month was 9.1% in 2002, reached a low of 6.8% in 2006 and increased to 8.3% in 2010. In terms of ever using drugs in their lifetime, the percentage of females reporting the use of marijuana and hashish was 19.7% in 2002 and decreased steadily to 15% in 2007, increased slightly to 15.8% in 2008, decreased to 15.3% in 2009, then increased slightly again to 15.8% in 2010. For comparison the

percentage for males in 2002 was 21.5% and decreased to 17.2% in 2008, increased to 18.6% in 2009 and decreased to 18.2% in 2010 (SAMHSA 2011).

As female roles in society have evolved, the involvement of women in risky behavior (e.g., alcohol, drug, and cigarette use) has extended in conjunction with their involvement in vehicle crashes (ONDCP 2006; Schwartz and Rookey 2008; Bergdahl 1999). To illustrate, driver mortality rates in the U.S. for young men were stable between 1960 and 1979; conversely the mortality rate for young women grew from 14% to almost 19% (Bergdahl 1999). An older analysis of FARS data from 1975 to 1990 revealed a similar trend; there was little change in male driver fatalities while female driver fatalities steadily rose from 16% to 24% (Cerrelli 1994). However, it is noted that that this increase was a function of increases in the number of female licensed drivers, their annual travel, and their fatality rate per vehicle miles travelled (VMT).

In addition, although research has consistently demonstrated that alcohol consumption is considerably higher among men than women (Greenfield 2002; Robertson et al. 2011), it has been acknowledged that the gender gap is shrinking in some European Union (EU) countries. Some have suggested that changes in cultural or social structural factors may have affected the drinking behavior of women (Robertson et al. 2011).

Finally, it has also been argued that changes in the socio-legal climate, mechanisms of social control, and social control policies have resulted not only in women having increased access to alcohol, but also in their being increasingly accountable for their behavior related to alcohol consumption. To illustrate, research from the 1980s suggested that when young women came into contact with police for DWI, warnings were more commonly issued instead of traffic violations or a citation for DWI (Farrow and Brissing 1990). More recently, this appears to occur less frequently as changes in drunk driving laws as well as law enforcement practices have increased female exposure to detection and arrest for DWI (Schwartz and Rookey 2008). In addition, a growing number of female police officers and higher levels of bureaucratization within police agencies have led to greater uniformity in the management of male and female offenders (Schwartz and Steffensmeier 2007; Robertson et al. 2011).

Regardless of the reason that this growth in relation to some aspects of the female drunk driver problem has occurred, there is hard data illustrating the growing prevalence of female arrests for DWI, and to a lesser extent, increases in female alcohol impaired crashes in a minority of states. As such, a more detailed examination of female drunk driving is warranted to better determine the relative priority of this issue in relation to other aspects of the drunk driving problem, as well as to gauge what efforts are required to address it.

Of equal importance, increased understanding of female involvement in drunk driving behavior is essential to inform the development of effective strategies to mitigate this problem. Although there has been substantial growth in knowledge regarding effective programs and policies to manage drunk drivers in the past two decades (NHTSA 2004; Robertson et al. 2006; Fell et al. 2011), the vast majority of available research on this topic is, not surprisingly, based upon the use of these interventions with a predominantly or even exclusively male offender population (Webster et al. 2009). Few studies have examined or evaluated the effectiveness of such drunk driving programs and interventions in relation to female offenders, even though they comprise a growing percentage of drunk driving arrests (White 2009; Schwartz and Rookey 2008). This may be due, in part, to the challenges associated with obtaining a large enough sample of female offenders to conduct meaningful evaluation research and data analyses (Moore 1994; Webster et al. 2009).

The literature that is available on female drunk driving interventions has mainly focused on the use of screening, assessment, and treatment programs with these offenders (Greenfield et al. 2007; Maxwell and Freeman 2007; McMurrin et al. 2011). However, little is known about the degree of effectiveness among females of other types of interventions such as alcohol monitoring technologies, DWI courts, and probation supervision strategies.

As such, there is a need to compile available knowledge and research about female drunk drivers as a first step towards the identification of effective strategies to address this segment of drunk drivers.



## 2. PURPOSE AND OBJECTIVES

There is no doubt that males constitute a significant proportion of the drunk driver problem (Argeriou et al. 1986; Jones and Lacey 2001; Zador et al. 2000; Mayhew et al. 2003). While there has been substantial growth in knowledge regarding drunk driving behavior and effective programs and policies to manage drunk drivers in the past two decades (NHTSA 2004; Robertson et al. 2006; Fell et al. 2011), still, a majority of the research that is available focuses on male offenders and the use of these interventions with a predominantly or even exclusively male offender population (Webster et al. 2009). Research examining the effectiveness of drunk driving programs and interventions among female offenders remains limited and this may be due, in part, to the challenges associated with obtaining a large enough sample of female offenders to conduct meaningful evaluation research and data analyses (Moore 1994; Webster et al. 2009).

However, women are an important part of the problem that is worthy of our attention and concern. In particular, evidence of a growing number of DWI arrests among females, and evidence to indicate that female DWI offenders may possess some different characteristics and have different treatment needs, suggests the need for greater understanding of this phenomenon and more defined approaches to prevention, detection, sentencing, supervision, and treatment of this population. While much is known about effective strategies to reduce drunk driving generally, there is little evidence to suggest these interventions are either appropriate for or as effective with female drunk drivers.

As such, it is important to take stock of available research and knowledge about this problem to gauge what efforts are needed to help address it. Such efforts can serve to both increase the level of knowledge and understanding about this issue as well as inform future research and the development of effective strategies.

Hence, the purpose of this report is to provide a current state of knowledge about drunk driving among female drivers. Its goals are to describe the magnitude of the female drunk driver problem, the characteristics of these offenders, the current involvement of female drivers testing positive for alcohol in fatal crashes, and effective strategies that are available and being applied to manage this population.

This report provides answers to the following questions:

- > How big is the problem?
- > What do we know about the characteristics of female drunk drivers?
- > To what extent do female drivers who test positive for alcohol in fatal crashes contribute to the alcohol crash problem?
- > What strategies to manage female drunk drivers are currently available and/or applied in the United States?
- > What do we know about effective practices to manage them?

Finally, the report concludes with some recommendations to guide future activities.

Of importance, research ranging from the 1980s through to present day is reviewed in chronological order in Section 3 (Magnitude of the Problem) and Section 4 (Characteristics of Offenders) to provide a complete perspective on this problem and also a sense of how it has evolved over time. This approach is useful to explore claims that the problem has grown in recent years. However, it is important to keep in mind that some of the studies described in this report were conducted more than two decades ago. As such, those findings stemming from much older studies should be interpreted with caution as they may or may not still be applicable today. Similarly, studies also utilized different BAC ranges and age ranges (particularly for young drivers) which make comparisons difficult at times.

It is also important to note that terminology used to describe the drunk driving issue has also evolved in the traffic safety field, particularly in the last decade. Historically, terms such as alcohol-related, impaired driving, drunk driving and drinking and driving were often used interchangeably. However, in the past decade, there has been a much clearer distinction drawn between these terms which are understood to mean different things. Generally speaking these terms mean the following:

- > Alcohol-related crashes refers to any crashes (including those involving pedestrians and cyclists) involving any level of alcohol;
- > Alcohol impaired crashes refers to crashes involving a driver with a BAC over the per se BAC limit of .08;
- > Alcohol impaired driving means driving with a BAC over the per se BAC limit of .08 or otherwise meeting the legal impairment threshold for a criminal conviction;
- > Alcohol positive drivers means drivers who have consumed alcohol but who may not reach the per se BAC limit of .08 or a legal threshold for impairment;
- > Drunk driving refers to a criminal offense (either over the per se BAC limit of .08 or impaired as defined by impairment-based statutes);
- > Drinking and driving refers to driving after consuming any amount of alcohol; and,
- > DWI means driving while intoxicated or driving while impaired and is used as a general term to refer to criminal offenses for drunk driving across the U.S. although terms used in specific states may vary.

As such, the authors of this report have utilized these terms as described above wherever possible. However, in reference to a few studies or to some older studies where the meaning of these terms is not well-defined, the authors of this report have relied upon the terms specifically utilized by the authors of the cited studies for consistency purposes. Hence, results should be interpreted with this caveat in mind.



## 3. MAGNITUDE OF THE PROBLEM

Female drunk drivers are a growing source of concern, although this population accounts for a much smaller proportion of the drunk driving problem relative to male drunk drivers (Argeriou et al. 1986; Jones and Lacey 2001; Schwartz and Rookey 2008; Robertson et al. 2011). This concern has emerged primarily due to documented increases in female arrests for DWI (Schwartz and Rookey 2008; Webster et al. 2009), and, to a lesser extent, incremental increases in female involvement in alcohol impaired crashes (NHTSA 2009a).

In particular, the continued growth and/or lack of declines in the magnitude of the problem among women, in the face of substantial decreases among male drunk drivers, warrants further attention and exploration both to better understand this issue as well as to inform the development of appropriate strategies to reverse this trend. As such, this section provides insight into the magnitude and extent of female drinking and driving and drunk driving behavior as measured by available data sources.

### 3.1 Self-report data

Generally speaking, females consistently report lower rates of drinking and driving behavior than men (Marelich et al. 2000). However, available self-report data on female drinking and driving behavior is mixed according to the nature and extent of the survey that is conducted. Data on each set of measures are presented in chronological order to provide the reader with a sense of different measures over the past three decades. Please note that differences in age ranges and BAC levels make comparisons challenging.

In the early 1980s, data from a national U.S. survey of 917 women revealed that the most common drinking-related behavior problem was driving while intoxicated. In this survey, 17% of all women drinkers indicated that they had driven while feeling drunk or high at least once in the preceding year (Wilsnack et al. 1984). The same survey showed that 66% of women who drank more than two ounces of alcohol per day reported driving while drunk within that year (Popkin et al. 1988).

According to Schwartz and Rookey (2008), data from the Behavioral Risk Surveillance Survey conducted by the Centers for Disease Control and Prevention on individuals aged 12 and older reveals that drinking and driving among females has been relatively stable for almost two decades. Between 1980 and 2000, women's portion of self-reported DWI averaged about 23% (Schwartz and Rookey 2008). More importantly, they note that the self-reported rates of DWI among males and females have equally declined approximately 35%, with much steeper declines occurring in the 1980s (Schwartz and Rookey 2008).

Similarly, a study (Chou et al. 2005) examining the periods 1991-1992 in comparison with 2001-2002, using national U.S. survey data from the National Longitudinal Alcohol Epidemiologic Survey (NLAES) and the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) revealed the following:

- > For the total sample (85,000+) the prevalence of drinking and driving decreased 22% during the decade (from 3.7% to 2.9%);
- > There were significant declines in driving after drinking among males (from 5.8% to 4.4%);
- > There were no significant changes in the rate of driving after drinking among females and the only significant decreases in the rates were among 18-29 year olds;
- > "Overall, there was a decrease in the gender difference in prevalence of driving after drinking over the last decade (sex ratio decreased from 3.41 to 2.93)" (p.227).

The authors of this study further noted that an examination of FARS data over this same period found that there was also a decline in the male to female ratio in alcohol-related fatal crashes from 9.0 in 1991 to 5.4 in 2001

and that rates of driving after drinking were more stable among younger age groups (ages 18-20 and 21-25).

In the last decade, NHTSA's National Survey of Drinking and Driving Attitudes and Behavior (2001) reported that 22% of drivers reported driving within two hours of consuming alcohol in the past year. Almost one-third of males (32%) reported doing this in contrast to 13% of females (Royal 2003). Similarly, a NSDUH Report (dated July 1, 2005) showed that 11.4% of women aged 21 and older (compared to 22% of men in the same age range) reported driving under the influence of alcohol or other drugs in the past year. A subsequent NHTSA National Survey (on Drinking and Driving Attitudes and Behavior) conducted in 2008 reported that approximately 20% of drivers admitted to driving within two hours of consuming alcohol in the past year. More than one-quarter of males (27%) reported doing this in contrast to 14% of females (Drew et al. 2010).

While it is apparent that the percentage of females who self-report drinking and driving is considerably less than males, it is difficult to discern the exact percentage of women who self-report this behavior due to variations in ages and survey methodologies. Despite these differences, it is apparent that a relatively small percentage of females self-report drinking and driving (10-20%) and this number has been stable for many years.

While somewhat different from self-report data, in 2007, there was a national roadside survey where drivers were randomly stopped, given a brief interview and asked to provide a breath, saliva and blood sample, to test for the presence of alcohol and drugs. These data also indicate a higher percentage of male drinking drivers compared to females, but also show that the problem seems to have decreased by a larger amount for males compared to females. To illustrate, according to the national roadside survey results with regards to BACs of nighttime drivers, there were significantly more males in all positive BAC categories (BAC=0.01-.14). There were also more males in the .15 BAC or above category, but this difference was not significant. When compared to national roadside survey results from 1996, the percentage of females with a BAC of .10 or higher decreased significantly from 1.5% in 1996 to 1% in 2007. The corresponding percentages for males significantly decreased from 3.5% to 1.8% (Lacey et al. 2009).

### 3.2 Arrest data

Females who drink are at greater risk of DWI, and when they do, they are more likely to be detected and arrested (Marellich et al. 2000). However, female involvement in drunk driving is an area that has gotten little attention until recently as a result of growing data that suggest that DWI arrests for women have risen nationally with some states seeing growth in the number of female DWI offenders compared to others. Of concern, the number of female DWI arrests has risen nationally by 28.8% between 1998 and 2007 (FBI 2008). Similarly, in 2003, 17% of those arrested for DWI in Illinois were women. This rate increased to 20% in 2007 (White 2009).

DWI is the second largest arrest category in the U.S. and these offenses comprise almost 10% of all arrests (FBI 2007). As a point of comparison, the number of persons killed in drunk driving fatalities was just slightly less than the number of homicide victims in 2006 (FBI 2007).

DWI arrests are the largest category of alcohol-related crimes that bring women into contact with the criminal justice system (Parks et al. 1996). While the total volume of female DWI arrest rates is far lower than that of men, substantial increases in female DWI arrests are a disturbing trend. For example, historical arrest data from 1976 to 1984 revealed that while women made up a relatively low percentage of those drivers arrested for DWI, there were substantial increases in the rate of arrest during this period from 6.5% to 11.5% of arrests (Popkin et al. 1988). Also, in 1980, just 9% of those arrested for DWI were female with the percentage rising to nearly 15% by 1996. By 2004, the percentage had reached 20% of all DWI arrests (Schwartz and Rookey 2008; Lapham et al. 2000).

Historical Uniform Crime Report (UCR) data from 1960 to 2004 controlling for population similarly demonstrates an increase in female DWI arrests. To illustrate, female DWI arrests per 100,000 population stood at 21 in 1960, 36 in 1970, 99, in 1980, 179 in 1990, and remained about the same (175 per 100,000 population) in 2004. For comparison, the rate per 100,000 population for males was 341 in 1960, 544 in 1970, 1,070 in 1980, 1,286 in 1990, and 818 in 2004 (Shwartz and Steffensmeier 2007).

There were also dramatic increases in DWI arrests across different age groups. To illustrate, between 1980 and 2004, the female portion of DWI arrests doubled or nearly doubled among 18-20 year olds (from 9% to 18%); 21-29

year olds (from 9% to 17%); 30-44 year olds (from 11% to 20%) and 45-64 year olds (from 10 to 17%) (Schwartz and Rookey 2008).

Some have argued that social changes in relation to women's substance use and driving behaviors, in conjunction with changes in law enforcement practices have contributed to the growing number of female DWI arrests. In terms of total arrests across all criminal offense types for females since 1960, there has been an increase in the percentage of arrests from 11% in 1960 to 23% in 2004. The majority of this increase is due to increases in property crimes as well as alcohol-related offenses including DWI arrests which increased from 6% in 1960 to 18% in 2004 (Shwartz and Steffensmeier 2007). These authors state that this increase in female crime is not due to equality between males and females, but rather female offending patterns are more likely influenced by the inequality and economic vulnerability of females relative to males. This means that female offending may be a result of females having less access than males to economic resources, education, employment, and being the sole provider for children.

Although this may help explain offending behavior, arrest statistics are also a product of law enforcement activity. Enforcement practices with regards to lower level crimes have changed as definitions of what constitutes certain offenses, such as minor assault or drunk driving, have become more expansive and inclusive. Since females are disproportionately involved in less serious types of offenses, expanding such definitions of offenses may "artificially increase women's arrest levels in comparison to men's" (Shwartz and Steffensmeier 2007, p.51).

For example according to Robertson et al. (2011), the reduction of the per se BAC limit from .10 to .08 in the 1990s had a stronger relative effect on women than men because the average BAC level of females is often lower at the time of arrest compared to men. More women account for less serious offenders than males, so widening the arrest net (for example by reducing the per se BAC limit from .10 to .08) has the potential to catch more female offenders (Schwartz and Rookey 2008).

It has also been postulated that the converging gender gap is due to increases in female DWI arrest rates in combination with declines in male DWI arrest rates. As evidence of this, data suggest that female arrest rates increased approximately 35% since 1980 while male arrest rates have declined more

than 35%. These differing trends have produced a sizeable increase in the female share of DWI arrestees (Schwartz and Rookey 2008).

It is interesting to note that although the gender gap has narrowed in general, UCR arrest data from 1980 to 2000, particularly in the 1990s, and data from the National Crime Victim Survey (NCSV) where victims are asked the sex of the offender show that the gender gap has remained stable. Further, although female arrest rates have more than tripled since the 1980s, the gender gap trend for violent offences has been stable which is provided as further evidence of women being more frequently arrested for less serious crimes (Shwartz and Steffensmeier 2007).

To summarize, the percent of females who account for DWI arrests is certainly growing, however, the reason for this growth is unclear. To date, several explanations for this growth have been proposed. Some have suggested that the increase in arrests reflects a real trend towards growing female involvement in drunk driving; others have postulated that dramatic reductions in arrests among males have skewed the perception of female involvement in arrests. Still others have argued that changes in legal policy have resulted in greater visibility of female drunk drivers to law enforcement generally, but, in particular, also brought more attention to women who tend to be more impaired at lower BACs due to physiological differences (Dawson et al. 1995; Wells-Parker et al. 1996; NIAAA 1997).

### 3.3 Conviction and supervision data

Data regarding the level of convictions of females for drunk driving offenses is sparse. According to a study by Robertson et al. (2011), the number of women convicted of drunk driving has increased during the past twenty years, but no data are provided as evidence of this. In a rather large study in Mississippi involving all males and females who were required to participate in a court-mandated DWI program between 1992 and 2008, researchers concluded that “the percentage of females convicted of DWI and mandated to participate in the MASEP<sup>2</sup> increased significantly between 1992 and 2008 (from 13% to almost 19%)” (p. 1417).

Not surprisingly, males account for the vast majority (over 90%) of DWI offenders who are incarcerated in jail in 1983, 1989 and 1996, however the percentage of females in jail for drunk driving offenses has grown incrementally since 1983. To illustrate, in 1983 women accounted for 5%

<sup>2</sup> Mississippi Alcohol Safety Education Program

of those in jail for DWI, shrinking to 4% in 1989; then growing to 7% in 1996 (Maruschak 1999). As of 1997, the percentage of males in state prisons for DWI was 94.3% (N=16,600) compared to 5.7% (N=1,000) for females; the percentage of men in jail was 92.9% (N=38,200) compared to 7.1% (N=2,900) for females; and, the percentage of males on probation was 82.6% (N=375,500) compared to 17.4% (N=79,000) for females (Maruschak 1999). Thus, although more men are in prison and in jail for DWI than women, it appears that there has been a small increase from 1983 to 1996 in the percentage of females incarcerated for DWI. Additionally, the percentage of women on probation for DWI is much higher than the percentage of women who are incarcerated and in jail for this offense. Unfortunately, these latter data do not provide an indication of whether these percentages have increased or decreased over time.

### 3.4 Alcohol crash data

This section begins with an examination of the relative risk of crashing among men and women at varying levels of BAC, followed by a brief summary of alcohol crash data. (Further analysis of female drivers testing positive for alcohol in fatal crashes is contained in Section 5).

In brief, a study by Zador et al. (2000) reported that the relative risk of receiving a fatal injury in a single-vehicle crash increases steadily with increasing driver BAC for both men and women in every age group. However, females in the 16-20 age group were reported to have a lower relative risk than males at every BAC level. It has been hypothesized that this finding may be due to the fact that females seem to drive more cautiously than males of the same age (Zador et al. 2000). Research also shows that relative risk did not vary according to gender for drivers aged 21 and older, and that the relative risk increased dramatically (over 80) with much higher BAC levels (Jones and Lacey 2001). Voas et al. (under review) used FARS and national roadside survey data to compare risk estimates of being involved in an alcohol impaired crash from 1996 to 2007. Both the 1996 and 2007 data showed that when BACs are equal, females and males have the same relative risk of being involved in a crash. When they examined drivers between 16 and 20 years of age, the 1996 results showed a substantial difference between the relative risk of young males and females. To illustrate, the relative risk of males at a BAC of .10 or higher was seven times higher than that of females. However, the 2007 data show no significant difference between

underage males and females in alcohol-related crash risk (Voas et al. under review). Another recent study of relative risk using case-control data found that females are less likely to drive with a BAC of .05 or higher without being involved in a crash and are less likely to be involved in a crash with a BAC of .05 or higher than males. However, females were more likely to be involved in alcohol-free crashes compared to males (Romano et al. under review).

With regard to female alcohol involvement in fatal crashes, a study by Burgess and Lindsey (1997) reported that females showed a greater reduction in alcohol impaired fatal crashes<sup>3</sup> between 1982 and 1995, and noted that male involvement decreased by 33% whereas female involvement declined by 41%. Indeed, U.S. fatality data demonstrate that the percentage of legally drunk female drivers has steadily increased, although changes have been incremental. For example, the percent of female drunk drivers in alcohol impaired fatal crashes grew from 12% in the 1980s to 13% in the 1990s; and then to 14% in the 2000s. It has been argued that these gradual increases in the percentage of legally drunk fatally injured drivers who are female are a result of more pronounced declines in male compared to female rates of DWI from the 1980s to 1990s (Schwartz and Rookey 2008).

An analysis of even more recent trends (2007-2008) in the number of alcohol impaired drivers involved in fatal crashes examined driver gender by state. Results showed that the number of alcohol impaired female drivers in fatal crashes either increased or remained the same in 15 U.S. states but remained stable overall, with ten states<sup>4</sup> reporting an increase and five<sup>5</sup> states reporting no declines (NHTSA 2009a). Of interest, the largest increases in the number of alcohol impaired female drivers in fatal crashes were in Ohio and New Hampshire (+8)<sup>6</sup>. Other states showing an increase in the number of alcohol impaired female drivers were Montana (+1), Nevada (+2), Wyoming (+3), West Virginia (+4), Indiana (+6), Washington (+6), Kansas (+7), and Tennessee (+7). However, in Kansas, New Hampshire, and Wyoming, the number of alcohol impaired drivers increased in 2008 among both males and females (NHTSA 2009a). In addition:

*“In 2008, the number of alcohol impaired female drivers remained flat or increased in 15 states, comprising about 20% of the number*

3 These alcohol-related crashes involved a BAC over .10.

4 The ten states are Ohio, New Hampshire, Montana, Nevada, Wyoming, West Virginia, Indiana, Washington, Kansas, and Tennessee.

5 The five states are Iowa, Maine, Maryland, Oklahoma, and Utah.

6 (8+) means there were eight more alcohol impaired female drivers in fatal crashes than the previous year.

*of female alcohol impaired drivers in fatal crashes nationwide. In comparison, the corresponding percentage for males was about 17% in the 13 states where the number of alcohol impaired drivers remained flat or increased” (NHTSA 2009a, p.2).*

A 2010 study by Tsai et al. examining alcohol involved crashes from 1995-2007 reported increases in crash rates among young alcohol positive female drivers aged 19-24. Of some concern, they report that the percentage of young female drivers with positive BACs increased on both weekdays and weekends. Therefore, “both the frequency and severity of alcohol involvement have steadily increased and this change is not restricted to the typical times of greater alcohol involvement” (p.19).

In light of all of these data, it is important to bear in mind the limitations of using alcohol impaired driver fatality data contained in FARS. The use of BAC as an indicator of driving impairment is problematic for a few reasons. First, FARS data include only drivers in fatal crashes. Drivers with higher levels of alcohol are much more likely to be involved in a fatal crash whereas at lower BAC levels this risk decreases. As such, these drivers are not representative of all drivers who drink, and particularly women who are impaired at lower BAC levels. In 2008, 25% of drivers in fatal crashes with a BAC over .08 were male and 13% were female (NHTSA 2009c), meaning that women are under-represented in the FARS data. In addition, despite improvements in the quality of BAC data in FARS, the 2002 FARS data reveal that no objective measure of drivers’ BAC level was recorded in relation to over half of the drivers in fatal crashes (Hedlund et al. 2004), meaning that BAC values for drivers were frequently missing. In these instances, NHTSA relies upon Rubin’s multiple imputation process to create sound statistical estimates for the missing BAC values (This process is explained in more detail in Section 5.1.).

So, while data are incomplete, the data that are available suggest that more women are involved in DWI crashes in some jurisdictions compared to measures at previous points in time, indicating that female drunk drivers are an important population in need of further investigation. Perhaps most compelling is 2008 FARS data which reveal that 1,837 fatalities in crashes involved an alcohol impaired female driver (NHTSA 2009a), making this issue worthy of our attention.

### 3.5 Summary

Female drunk drivers account for a much smaller proportion of the drunk driving problem relative to male drunk drivers (Argeriou et al. 1986; Jones and Lacey 2001; Schwartz and Rookey 2008; Robertson et al. 2011). However, documented increases in female arrests for DWI (Schwartz and Rookey 2008; Webster et al. 2009), and incremental increases in female involvement in alcohol impaired crashes in some jurisdictions (NHTSA 2009a) indicate that concern about the female drunk driving problem is warranted.

Available self-report data on female drinking and driving behavior is mixed according to the nature and extent of the survey that is conducted. Despite differences in survey methodologies and variations in age groups and BAC ranges studied, it is apparent that a relatively small percentage of females self-report drinking and driving (10-20%) and this number has been stable for many years.

Historical arrest data from 1976 to 1984 reveal that the rate of arrest for DWI among women increased over this period from 6.5% to 11.5% (Popkin et al. 1988). The percentage of females arrested for DWI further increased from 9% in 1980 to 20% in 2004 (Schwartz and Rookey 2008; Lapham et al. 2000). Data also reveal that DWI arrests for women have risen nationally by 28.8% between 1998 and 2007 (FBI 2008). An increase in female DWI arrests is similarly demonstrated across different age groups (Schwartz and Rookey 2008) and when controlling for population (Shwartz and Steffensmeier 2007).

The percent of females who account for DWI arrests is certainly growing, however, the reason for this growth is unclear. To date, several explanations for this growth have been proposed. Some have suggested that the increase in arrests reflects growing female involvement in drinking and driving; others have postulated that dramatic reductions in arrests among males have skewed the perception of female involvement in arrests. Still others have argued that changes in legal policy and enforcement practices have resulted in the greater likelihood that law enforcement will detect and arrest female drunk drivers. Some have further suggested that these legal and enforcement changes have brought more attention to women who tend to be more impaired at lower BACs due to physiological differences between males and females (Dawson et al. 1995; Wells-Parker et al. 1996; NIAAA 1997).

Data regarding the level of convictions of females for drunk driving offenses is sparse. Although more men are in prison for DWI than women, it appears that there has been a small increase from 1983 to 1996 in the percentage of females incarcerated for drunk driving (Maruschak 1999).

The relative risk of being involved in a crash is the same among men and women when BACs are equal (Voas et al. under review). U.S. fatality data demonstrate that the trend in female involvement in alcohol impaired crashes has steadily increased, although changes have been incremental (Schwartz and Rookey 2008). Recent FARS data from 2008 reveal that 1,837 fatalities in crashes involved an alcohol impaired female driver (NHTSA 2009a). So while the data are incomplete, available evidence suggests that female driver involvement in alcohol impaired crashes has slightly increased nationally, although there have been variations in some states. Overall, this is an issue worthy of our attention.



## 4. CHARACTERISTICS OF OFFENDERS

There is some growing evidence that the number of female drunk drivers is increasing. In particular, growth in the number of female DWI arrests and limited evidence of growth in DWI convictions, as well as incremental increases in the percentage of female drivers testing positive for alcohol in fatal crashes in a minority of jurisdictions discussed in previous sections, suggests that greater understanding of and attention to this problem is warranted. In this regard, a clear awareness of the profile and characteristics of female drunk drivers is useful to provide insight into the nature of this problem and to help identify potential mitigation strategies.

One of the historical challenges associated with better understanding the characteristics of female drunk drivers has been the smaller number of them who are detected, arrested, and convicted for DWI offenses, as well as the smaller number of female offenders who re-offend or recidivate. Generally speaking, this has resulted in it being more difficult to obtain a sufficient sample size of this population which has made conducting research on this sub-group of the drunk driver population problematic to some extent (Moore 1994). While available data on the characteristics of female drunk drivers have increased in recent years, much more research has been conducted on populations of females who consume alcohol generally, and not all of this research is specific to drunk driving offenders.

Better understanding of the profile of female drunk drivers is important to inform decisions regarding prevention, sentencing, and treatment strategies. Hence, it is beneficial to more closely examine the profile of these offenders. This knowledge can also provide insight into what types of strategies may be more effective to address this population.

The available research to inform understanding of the characteristics of female drunk drivers is reviewed in this section. The characteristics of female offenders are also compared to those of males where appropriate and feasible in order to provide context as it is difficult to discuss drunk driving among women without considering how they differ from men (Wells-Parker et al. 1993).

Research examining the characteristics of drunk drivers has addressed a range of different dimensions in an effort to better understand drunk driving behavior. Descriptions frequently include the following key demographic characteristics: alcohol misuse, age, socio-economic status, co-occurring disorders, family history, drunk driving recidivism and other offending behavior. While there has been much research on these factors in relation to male drunk drivers, less work has specifically examined female offenders. In addition, studies that have specifically examined female DWI recidivists are limited.

For the most part, the profile of a female DWI offender differs somewhat from that of a male offender, yet they also share some common characteristics. These characteristics are discussed in more detail below.

## 4.1 Alcohol misuse

Alcohol misuse among women is a very important factor to consider in relation to female drunk driving for several reasons. Research shows that women metabolize alcohol differently from men in that women initially metabolize much less (only about one-quarter as much) alcohol in the stomach and intestines as compared to men. This means that more alcohol is absorbed into the blood as ethanol (Gudrais 2011; Greenfield 2002). In addition, females generally have less water in the body and a lower body mass. These factors work to intensify the effects of alcohol for women relative to men and women become intoxicated after drinking half as much alcohol as compared to men (Greenfield 2002; Waller 1997; Lex et al. 1991). Of equal concern, these physiological differences also contribute in part to

the more rapid progression of alcohol dependence such that women often require medical intervention an average of four years earlier than males who are problem drinkers (Gudrais 2011).

Also of interest, in general, studies have shown that females tend to consume less alcohol than males (Jones and Lacey 2001; Greenfield 2002). However, in regards to certain portions of the female population, this trend may be changing (Popkin 1991).

As recently as the early 1980s, the ratio of alcohol-dependent men to alcohol-dependent women was 5:1. By the early 1990s that gap had shrunk to 2.5:1 (Greenfield 2002). Research also shows that the onset of drinking and heavier drinking among females is occurring at an earlier age, and the gender gap between young females and young males in relation to alcohol dependence is also shrinking (Greenfield 2002; Robertson et al. 2011).

These changes in female drinking behavior are of concern, particularly because some studies have revealed that alcohol use is a strong predictor of developing alcoholism. A study by Flensburg-Madsen et al. (2007) indicates that both the amount of alcohol consumed and the frequency of consumption are positively associated with later risk for developing alcoholism, but that there are different thresholds of harmful drinking among men and women that put them at risk for developing alcoholism. The risk of developing alcoholism for women increased with very low levels of consumption (the risk of alcoholism increases significantly with intake of less than 14 drinks per week); conversely the risk for men increased with consumption of more than 21 units of alcohol per week. It is important to note that these research findings are based on a 26-year longitudinal study and that the average year of birth for this population was 1924. As such, findings may not be directly generalizable to a younger cohort.

Alcohol misuse tends to be positively associated with traffic incidents for both men and women. Some studies that examined the ways that alcohol affects male driving patterns have been generalized to the female population. Little is known about how alcohol affects women's driving performance, although, it has been suggested by researchers that women who consume alcohol, even at lower BACs, are more frequently involved in crashes than drinking men (White and Hennessey 2006). A more recent study by Elliott et al. (2006) found that alcohol is significantly associated with all types of traffic incidents for women (Elliott et al. 2006). These authors also reported that "There were

significantly stronger associations between women’s alcohol use/misuse and crashes, and their marijuana use and offenses, than among men” (p. 259).

Research also has demonstrated that women arrested for drunk driving and female drivers testing positive for alcohol in fatal crashes were less intoxicated than their male counterparts as it can take 15% less alcohol for women to reach the same level of intoxication as men (Popkin et al. 1988; White and Hennessey 2006). Women who had a BAC over .05 were found to be twice as likely as men to be involved in a motor vehicle collision (Elliott et al. 2006). As such, it appears that women may be less intoxicated than men, but have a higher crash risk.

Research suggests that alcohol misuse issues are prevalent among drunk drivers of both genders, and a significant number of people arrested for drunk driving have a variety of alcohol misuse issues. It has been reported that a large majority (85% to 90%) of men and women arrested for a DWI offense were suffering from substance abuse. Evidence also suggests that DWI offenders drastically under-report their use of alcohol and drugs as well as other problems during their court-mandated screenings (BHRCs 2007).

For example, Wells-Parker and colleagues (1991) determined that 47% of female DWI offenders were classified as “high-problem-risk” compared to 57% of male DWI offenders, although it was acknowledged that the data may under-report substance use problems for men and women because the information comes from self-reporting, and validity may be uncertain as a result of fear of legal consequences. In a study conducted by Parks et al. (1996) of DWI offenders in the New York Drinking Driver program, 32% had no diagnosis for an alcohol problem. However, 43% of offenders were alcohol abusers and 25% were alcohol-dependent. More recently, a five-year follow-up study of convicted DWI offenders revealed that 85% of female offenders (compared to 91% of male offenders) were diagnosed with either alcohol abuse or alcohol dependence (Lapham et al. 2000). In addition, a study between 2000 and 2005 by Maxwell and colleagues of admissions of DWI offenders to treatment in Texas found that women were more impaired and experienced more problems than their male counterparts (Maxwell and Freeman 2007).

A 2011 study examining the characteristics of DWI offenders in treatment in Texas found that females were most likely to be diagnosed with a primary problem with sedatives or opiates, whereas males were most likely to be

diagnosed with a primary problem with alcohol and cannabis (Maxwell 2011). In addition to the finding of dependence on sedatives and other opiates among women, this study also found that there was a shorter period of time between the first use of these drugs and admission to treatment among women which speaks to the addictive potential of these drugs (Maxwell 2011).

These studies demonstrate that a substantial proportion of female DWI offenders are experiencing substance abuse problems, and that the gravity and complexity of those problems is not insignificant (White and Hennessey 2006). There is also some evidence to suggest that female alcohol consumption may be a result of issues specific to women such as “their tendency to act as caretakers, sometimes to the exclusion of their own needs” (Gudrais 2011, p.10).

## 4.2 Age

Age is an important variable to consider when discussing drunk drivers because younger driver age groups have a higher risk of collision involvement, even when sober, compared to older drivers (Peck et al. 2008). For example, young drivers of both genders aged 15 to 20 years old are killed in traffic collisions at twice the rate of the general driving population; alcohol is involved in over 35% of these collisions (NHTSA 2006).

Knowledge about which age groups are at higher risk for alcohol positive crash involvement is also important to inform the development of effective strategies to address these drivers. However, a review of the literature on female drunk drivers illustrates some of the challenges associated with this task. It is noted that age ranges across studies are not standardized which complicates the use of comparisons. In some studies age 21 is used as a division point between young and adult women, whereas other studies use age 24. Also, recent data regarding the average age of first DWI offenders who are female is not available.

### 4.2.1 Adult women

Age-based studies on female drunk drivers are limited and fragmented to some extent. Studies have more often focused on young female drivers who are positive for alcohol (discussed later in this section), or on the drinking behaviors of women throughout their different life stages, although not always in relation to their driving behaviors or drunk driving offenses.

Nonetheless, there are some data to inform our understanding of the role of age in relation to drunk driving among females.

Historically, drunk driving among adult females has been an area of concern, although the level of concern has been less than that for male drivers. For example, between 1964 and 1979, women aged 21-29 reported heavier, more frequent drinking, even if they were driving. This was also true for women in the labor force (Popkin 1991; Berghdal 1999). As mentioned previously, changes in social norms over the past three decades have been linked to an increase in drinking problems among women. Lex et al. (1991) found that these changes were reflected in higher consumption patterns by women between the ages of 35 to 49 in the 1980s. Similarly, during the same timeframe, Popkin et al. (1988) found an increase in drinking among certain female sub-groups: those aged 35 to 49, younger, employed women, and part-time, employed women. It is important to note that this age group has also been linked to both higher alcohol consumption and higher risk of crash involvement (Lex et al. 1991; Popkin et al. 1988).

Of some interest, one study reported that the average age of female first DWI offenders is about 31 years, although this study was published in 1987 by Shore and McCoy. In a study of 619 females arrested for DWI in Kansas, almost half (47.5%) of female first offenders were in their twenties, 23.7% were in their thirties, and 9.4% were in their forties (Shore and McCoy 1987). Similarly, a study of a Drinking Driver Program (DDP) conducted in New York in 1992 that involved 800 women aged 18-77 revealed that almost half of offenders (45%) were under the age of 30 (Parks et al. 1996).

Schwartz and Rookey (2008) found that, compared to females in all other age groups, women between the ages of 21 to 44 who were employed may be more likely to be convicted for DWI. Of some concern, a probation study in the U.S. showed that 13% of women were pregnant at the time of their DWI arrest. Also, almost all female DWI offenders were of child bearing age (Hennessey 2008).

It is well known that male involvement in road crashes generally, and in drunk driving crashes in particular, declines with age. This phenomenon is comparable among females (Peck et al. 2008). To illustrate, in 2005, male and female drivers aged 21 to 24 had the highest percentage of involvement in alcohol-related fatal crashes where their BAC level was over .08 (32%),

followed by 28% of drivers between the ages of 25 to 34 and 23% of drivers between the ages of 35 to 44 (NHTSA 2006).

Most recently, data from the FBI UCR in 2009 reveal that there were 860,689 men were arrested for DWI, compared to 251,695 women. Of the total DWI arrests for females, almost 28% were aged 18-24 and almost 18% were aged 25-29. In addition, women aged 30-34 accounted for 12% of arrests; ages 35-39 were 11%; and, ages 40-44 and 45-49 were 10% each. Finally women aged 50 and older accounted for 11% of DWI arrests (FBI 2010).

#### 4.2.2 Young women

Motor vehicle crashes are one of the leading causes of death among youth within the U.S. and alcohol remains one of the biggest factors associated with crash risk for young drivers of both genders (Peck et al. 2008). Even though it is illegal to consume alcohol before the age of 21 in the U.S., BACs over .08 (which is illegal per se for drivers of all ages) are not uncommon among young drivers (NHTSA 2006). Although some data show that young people are less likely to drive after drinking compared to older drivers, when it does occur, young drivers who consume alcohol are at a much higher risk of collision, even at lower BAC levels due to their inexperience drinking as well as their inexperience driving (Mayhew et al. 2005; Robertson et al. 2010). Again, for the purposes of this section age ranges vary across studies with some using age 21 or age 24 as a division point, and this can complicate comparisons across studies.

Studies have documented increases among young females in alcohol involved crashes for quite some time. For example, a study in North Carolina using data from 1976-1985 revealed that, among females aged 18 to 20, involvement in alcohol-related crashes increased 74% in comparison to a decline of 27% among males in the same age group (Popkin 1991). (Note that the author uses the term alcohol-related and not alcohol impaired.) According to a study by Tsai et al. (2010), while the rate for 16 year old female drivers in alcohol involved crashes decreased, females aged 17 and 18 saw no change in their involvement, and females age 19 -24 years saw an increase in alcohol involved crashes between 1995 and 2007, making their involvement almost as high as that of male drivers.

Previous studies also suggest that young DWI females possess a range of characteristics related to risky behavior. For example, Moore (1994) interviewed 180 females aged 16-20 who were convicted of DWI while under the legal drinking age (21 years) in the U.S. They found that 19% of the females were antisocial and accounted for a significant portion of the following events: reported binge drinking (42%), being intoxicated (55%), impaired driving (65%), driving after drinking (32%), riding with other drunk drivers (52%), and involvement in crashes (67%). These females were also associated with the highest rates of psychosocial stress and were impacted by problems at school and home, boredom, and unemployment. These results show that like males, there are a range of subsets of female drunk drivers (McMurrin et al. 2011).

A female twin study involving females born in Missouri over a ten year period (July 1975 – June 1985) revealed that alcohol-related driving risks were fairly common among those studied. It revealed that almost one-quarter of females reported being a passenger in a car with a drunk driver, while they were also drunk; approximately 17% of them drove while impaired; and almost 3% were in an alcohol-related vehicle collision or arrested for a DWI offense (Lynskey et al. 2007).

Although young male drivers continue to account for 73% of the drivers in young driver alcohol-related crashes (term used by authors of study), evidence suggests that young women are also at risk for alcohol-related fatalities, and that gender differences in alcohol-related motor vehicle crashes may be converging (Lynskey et al. 2007). Young women's use of alcohol and subsequent involvement in a fatal crash was less than that of young men in the late 1990s. However, an increase in involvement in alcohol involved fatal crashes among female drivers aged 19 to 20 and 20 to 24 from 1995 to 2007 was noted (Tsai et al. 2010).

Most recently, in 2009, almost 25% of all fatally injured alcohol impaired drivers (at .08 or above) were between the ages of 16-24 (NHTSA 2010). NHTSA's 2009 FARS data revealed that, when broken down by gender, there was a somewhat larger percentage of fatally injured legally impaired female drivers (27%) compared to males (23%) that were between the ages of 16-24. Of greatest concern, the Uniform Crime Reports for 2009 found that 300,091 charges for DWI offenses were laid against youth aged 16-24, with 10,712 of those charged being under the age of 18 (FBI 2010). Females

accounted for approximately 24% of the charges in each age category; 71,684 were females aged 16-24 years and of this group, 2,668 were under 18 years of age (FBI 2010).

Past and current literature has noted that there are a range of individual, family, environmental, and social factors that can contribute to the increased risk of drinking and driving among youth. Research has noted that risk of general traffic offenses and collisions is correlated with substance abuse, poor school performance, lack of parental involvement, and other risky behaviors (Elliott et al. 2006).

One factor of particular concern among youth is the age of onset of drinking. Studies show that youth who became drunk for the first time at a younger age (as compared to those who were drunk for the first time at 19), were more likely to “drive after drinking, drive after five or more drinks, and ride with a driver who was high or drunk” (Hingson et al. 2003, p.27). Even more worrisome was that those who were first drunk at a younger age also believed that they could drink more while still driving both safely and legally (Hingson et al. 2003).

Adolescence is the transition period between childhood and adulthood. During this time significant changes occur in the body, including the formation of new networks in the brain. Frontal lobe development and the refinement of neural pathways and connections continue during teenage years and into the early 20s (Begley 2000). Damage from alcohol at this time can be long-term and irreversible affecting both memory and behavior control (White 2001; Brown et al. 2001).

In addition, for those who begin alcohol consumption at an earlier age, the greater the likelihood that their usage may develop into addiction later in life. People who begin drinking before age 15 are four times more likely to develop alcohol dependence at some time in their lives compared to those who have their first drink at age 20 or older (National Alcohol Strategy Working Group 2007). Additional studies have found that more than 40% of those who began drinking prior to age 13 met diagnostic criteria for alcohol dependence later in life. These rates dropped to 24.5%, 16.6%, and 11% for those who started drinking at ages 17,18 and 21 (Grant and Dawson 1997).

These data warrant concern, in part, because early exposure to alcohol consumption is a risk factor linked to drinking and driving behavior. In the past decade, more attention has been directed to the age at which youth begin to use alcohol and whether this can predict the risk of drinking and driving. Results of a national survey<sup>7</sup> of 42,862 respondents revealed that 65% had consumed alcohol (49% before age 21; 3% before age 14) with the age of onset typically being 19 years. The study revealed that:

- A greater proportion of those individuals who began drinking at an earlier age reported driving after drinking too much, and crash involvement due to drinking both in the past year and at any point in their life;
- Individuals that were under age 14 when they began drinking were three times more likely (compared to individuals who began drinking after age 21) to report having ever driven after drinking too much;
- They were also four times more likely to report doing this in the past year (Hingson et al. 2002).

In addition, “respondents who began drinking before age 14 were seven times more likely to report ever being in a motor vehicle crash because of their drinking” (Hingson et al. 2002, p.87).

These results support previous findings that an earlier onset age of alcohol consumption is linked to a variety of negative alcohol-related outcomes such as heavy and prolonged drinking, alcohol dependence, and unintentional injury, including from motor vehicle crashes (Hingson et al. 2003).

Collectively, these data indicate a fairly consistent pattern of increased alcohol involvement and driving among young females. It further suggests that there may be different sub-groups of offenders in which age is a factor. Young female drinking drivers appear to have different characteristics than their older counterparts. Younger women are continually being encouraged to take on traditional male roles within society with greater frequency than previous generations. These young women may feel compelled to exhibit behavior that has historically been associated with young males such as aggression and risk-taking (Tsai et al. 2010). Increased societal and peer pressure is also a contributing factor in the increasing number of young women who abuse alcohol and drugs in order to cope with stress and boost

<sup>7</sup> 1992 National Longitudinal Alcohol Epidemiologic Survey sponsored by the National Institute on Alcohol Abuse and Alcoholism.

confidence. While these pressures are not limited to younger females, the earlier onset of the drinking age among youth in general would suggest that this subset of the general population is more greatly affected. As a result, interventions targeted at young female drivers are needed.

In general, little is known about effective strategies to manage young drivers (NHTSA 2004) convicted of DWI offenses, particularly young female drivers. This is troubling given that young drivers convicted of DWI offenses are most likely to be amenable to behavior change; however, the young age at which they become involved in drinking and driving places them at greater risk of becoming the hard core and repeat drunk drivers of the future.

To summarize the role of age in female drinking and driving and drunk driving behavior, it is clear that women across age categories are involved in drunk driving arrests as well as alcohol involved crashes. Generally, their rates of involvement decrease with age, and the population of greatest concern is often young females. In particular, the increasing involvement of young women with alcohol, in combination with their inexperience driving and their growing propensity for risky driving warrants our attention and further research.

### **4.3 Socio-economic status**

Research providing insight into the socio-economic status (i.e., education, employment, and marital status) of convicted male DWI offenders has repeatedly established that these offenders often have less education, are unemployed, and are more often single (i.e., divorced or separated) (Simpson et al. 1991; Simpson et al. 1996; Jones and Lacey 2001; Simpson et al. 2004).

Research also suggests that female drunk drivers often share these characteristics, although findings in the literature are more mixed; some studies report lower levels of education and employment among female DWI offenders compared to males whereas other studies suggest comparable or higher levels in relation to both of these factors. Ultimately, this suggests that more research into this issue is needed. In contrast, research that compares the extent to which male and female offenders are divorced, separated, or single is more consistent, revealing that females are more likely than male DWI offenders to possess these characteristics. Available research about socio-economic status of female DWI offenders is briefly discussed in more detail below.

Some studies from the 1980s and 1990s suggest that for both male and female DWI offenders there is little difference between their levels of education (Chalmers et al. 1993). For example, findings reveal that, when comparing first offenders participating in an alcohol education program with second offenders participating in a 14-day residential treatment program and multiple offenders who are incarcerated, the level of education across these sub-groups decreases in a parallel fashion as offenders move from less serious to more serious interventions (Argeriou et al. 1986).

Earlier research also suggests that when female DWI offenders are employed a majority of them work in “pink-collar” occupations as waitresses or housekeepers (Shore and McCoy 1987). Other research suggests that almost 30% of female DWI offenders are homemakers, compared to less than 2% of males (Chalmers et al. 1993).

Conversely, a study of 274 women and 3,151 men convicted of drunk driving offenses and ordered to attend a safety action program in Mississippi between 1976 and 1979 revealed that female offenders had higher levels of education and were older compared to men (Wells-Parker et al. 1991). Similarly, a study of a Drinking Driver Program (DDP) in New York in 1992 reported that, of 800 female DWI offenders aged 18-77, the majority (almost 70%) were employed full-time and had at least some college education (Parks et al. 1996). Conversely, a few years later, Chang et al. (1996) reported lower rates of employment for female DWI offenders compared to males.

A 2008 study of 729 repeat DWI offenders (male and female) participating in a residential education and treatment facility in Massachusetts reported that female DWI offenders had more education than males, however their level of income was lower (Laplante et al. 2008). Additionally, a comprehensive review of drunk driving studies comparing males and females concluded that “Educational underachievement is part of the pattern of risk for drunk driving for both young men and young women” (McMurrin et al. 2011, p.918).

Further investigation into levels of education and employment is needed for two reasons. First, the level of education among female offenders has direct implications for the tailoring of drunk driving program content to meet the reading and comprehension skills of these offenders. Second, and perhaps more importantly, the cost of these programs will affect offenders’ ability and willingness to pay program costs which ultimately will influence their participation levels.

Research into the marital status of female drunk drivers has produced more consistency, showing that female drunk drivers, when compared to male drunk drivers, are even more likely to be divorced or single (McMurran et al. 2011; Chang et al. 1996; Shore and McCoy 1987; Argeriou et al. 1986).

To illustrate, a 1986 study by Argeriou reported that “When age is held constant, women offenders within sub-groups<sup>8</sup> continue to exhibit higher rates of divorce/separation than their male counterparts” (p.131). These findings suggest that the risk of a drunk driving arrest among divorced or separated women is more pronounced.

A study of a Drinking Driver Program in New York in 1992 that involved 800 female drunk driving offenders aged 18-77 reported that 44% of women had never been married. It further noted that women who were not yet diagnosed (re. alcohol issues) were more often married (64%) than those in the abuse group (52%) or dependent group (55%) (Parks et al. 1996).

A study involving 192 male and 49 female participants in a state-approved first offender DWI education program in California in 1993 also revealed that almost 41% of women were divorced or separated compared to less than 18% of men (Chalmers et al. 1993). In 2000, a study by Lapham et al. reported that female DWI offenders, when compared to male DWI offenders, were less likely to be married, to have prior DWI convictions, or to be referred for treatment.

It has been suggested that the divorce rate being higher among female DWI offenders than males may be indicative of the fact that relationship failure may have had a stronger impact on the drinking behavior of females compared to males. This can be linked to the fact that females tend to have an internalized response to stress, such as alcohol or drug use, which can increase their risk of other dangerous behavior such as drunk driving. McMurran et al. (2011) concluded that women can be distressed by their marital situation and turn to alcohol as a coping mechanism. However, it should be noted that women who did have a partner were most likely to be living with someone who had an alcohol problem (McMurran et al. 2011).

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8 Note that the subgroups in this study included those first offenders that participated in a Driver Alcohol Education, second offenders who participated in a 14-day residential program, and both second and multiple offenders who were incarcerated.

The fact that a significant proportion of females are single, divorced or separated, or more likely to be living with a partner with an alcohol problem is a source of concern. These factors can impede the ability of females to seek treatment as a result of limited financial means and a lack of support associated with childcare as women are most often the primary caregiver with custody of children (Greenfield 2002).

#### 4.4 Co-occurring disorders

Co-occurring disorder refers to the co-occurrence of two or more mental health or substance use disorders. Persons with a substance abuse problem have an increased chance of having a mental health problem. Likewise, persons with mental health problems are at a higher risk of having a substance abuse problem (Skinner et al. 2004). These disorders appear to be more prevalent among the drunk driving population as compared to the general population. The reason for these disorders may vary. For example, in cases where alcohol abuse may be a consequence of an offender's self-medication due to a mental health issue, the alcohol abuse may be a symptom of a greater problem which will determine the method of treatment(s). Moreover, many offenders who abuse substances also have histories of trauma, physical and sexual abuse, and co-occurring mental disorders (e.g., anxiety, post-traumatic stress disorder, schizophrenia, bipolar disorder, depression) or drug-use disorders that can make treatment more complex (SAMHSA 2005). As such, the National Institute on Drug Abuse (NIDA) recommends an integrated approach for dealing with these offenders (NIDA 2006).

A handful of larger epidemiological studies have found that between 13-17% of individuals in the general population who have had an alcohol use disorder during the past year have also had a co-morbid drug use disorder in the past year. This rate increases to 20-23% when considering lifetime use disorders (Falk et al. 2008). Of greater concern, lifetime co-morbid drug use disorder rates are relatively higher among individuals with alcohol dependence than among those who abuse alcohol and among women than men. Thus, these studies have demonstrated that alcohol use and drug use disorders are quite likely to co-occur. Not surprisingly, "DWI offenders are more likely than the general population to suffer from co-morbid psychiatric disorders in addition to a substance abuse disorders (The Dram 2007, p. 1). As a consequence "understanding the psychiatric profiles of repeat DWI offenders is important for developing and delivering effective treatment" (The Dram 2007, p. 1).

To illustrate, in a sample of 729 patients in a two-week inpatient treatment facility for court-sentenced repeat DWI offenders (i.e., offenders electing treatment in place of prison time), Shaffer et al. (2007) found that the offenders had higher lifetime and past-year co-morbidity rates than the general population with regards to alcohol use and drug use disorders, conduct disorder, post-traumatic stress disorder, generalized anxiety disorder, and bipolar disorder. Almost half qualified for lifetime diagnoses of both addiction (i.e., alcohol, drug, nicotine, and/or gambling) and a psychiatric disorder.

When comparing the role of co-occurring disorders among male and female DWI offenders, some studies demonstrate distinct differences among men and women.

Chalmers et al. (1993) studied personality traits and alcohol problems among 241 convicted first DWI offenders (192 men and 49 women) in California. Traits that were predictive of problem drinking for women included depressiveness, alienation and over-control compared to emotionality, impulsivity, and low self-confidence among men. Depressiveness was predictive of problem drinking for both women and men (Chalmers et al. 1993).

One study of convicted first DWI offenders (1,208 females and 1,407 males) in New Mexico referred to a screening program between 1989 and 1992 found that alcohol use disorders are more common for males (91%) than females (85%), but female offenders were more likely to have major depressive disorders (28%) and post-traumatic stress disorder (27%) than males (13% and 12% respectively). Findings from this study further suggest that in terms of overall psychiatric morbidity, female DWI offenders diverge more from the general population than males (Lapham et al. 2001). A previous study of the same offenders also found that of those with alcohol use disorders, 50% of women (compared to 33% of men) had an additional psychiatric diagnosis (Lapham et al. 2000).

A study by Maxwell and Freeman (2007) of males (21,155) and females (8,464) convicted of DWI and entering treatment in Texas between 2000 and 2005 reported that higher degrees of addiction severity and co-occurring mood disorders suggest that female DWI offenders possess more complex problems than males. It was also noted that when these offenders return to an environment that lacks sources of support, they will likely repeat their pattern of alcohol and/or drug abuse.

According to Laplante et al. (2008), “Both male and female repeat DWI offenders have extensive but different psychiatric histories that might play a significant role in DWI recidivism” (p.209). To elaborate, the study revealed that, as compared to males, female repeat DWI offenders were more likely to indicate prior experiences with alcohol and nicotine dependence and also a history of psychological disorders (including bipolar, anxiety, and post-traumatic stress disorders). It further reported that these female offenders additionally had significantly higher psychiatric morbidity relative to their male counterparts (Laplante et al. 2008).

A more recent study by Freeman et al. (2011) of DWI and non-DWI clients in substance abuse treatment in Texas between 2005 and 2008 found that female clients (both DWI and non-DWI clients) were more likely to be diagnosed with mental health problems and more likely to be placed on medications upon admission to treatment compared to males.

Collectively, these findings indicate that there is a need to treat a not insignificant part of the female DWI offender population, not only for alcohol misuse problems, but also mental health problems. In addition, it is equally important to ensure that these offenders receive social support as part of the treatment process (McMurran et al. 2011).

Drug use among female drunk drivers is also prevalent, but some research suggests that involvement in drug use may be more comparable among male and female DWI offenders. In a study of 812 female offenders in the New York Drinking Driver Program conducted by Parks et al. (1996) in which 43% of offenders were alcohol abusers, and 25% were alcohol-dependent, among these two latter groups, 19% and 50% (respectively), also reported drug problems. Similarly, a study of 1,105 DWI offenders in New Mexico found that of those with alcohol use disorders, 32% of females (compared to 38% of males) also had a drug use disorder (Lapham et al. 2000). However, Maxwell and Freeman (2007) reported that the use of illicit drugs was higher among females as compared to males.

More recently, a study examining the characteristics of DWI offenders in treatment found that females were most likely to be diagnosed with a primary problem with sedatives or opiates, whereas males were most likely to be diagnosed with a primary problem with alcohol and cannabis (Maxwell 2011). Similarly Freeman et al. (2011) found that females were more likely than males to have problems with methamphetamines, cocaine, and opiates.

Given that the use of drugs appears to be somewhat common among female DWI offenders, it is important that offenders are appropriately screened, identified, and treated for any drug use disorder.

## 4.5 Family history

The family history of female drunk drivers is an important consideration particularly in light of research<sup>9</sup> suggesting that between 50% and 60% of the risk linked to female alcoholism is genetically influenced, as is the case with males (Kendler et al. 1992). Research showing a relationship between female DWI offenders and family history, although fragmented, covers a range of issues including the use of substances at a young age, problems in relationships with parents, and family history of substance use, alcoholism, and involvement in DWI offenses.

For example, in a study of 343 students in grade ten (52% male; 48% female; mean age 15.8 years) slightly more problem behavior was reported by females in relation to alcohol, marijuana, and tobacco use. These females were more likely to report problems in relationships with parents including a lack of parental approval in chosen friends. They also had “more direct experience with adults or friends who had been in drinking-related accidents, and more often knew an adult/parent who had a problem with alcohol” (Farrow and Brissing 1990, p.219).

Clinical and community studies in the 1980s in St. Louis revealed that, not only was the onset of alcohol dependence earlier among both DWI men and women, but that both genders also had higher rates of this problem. The studies also found that for women, history of alcoholism in the family had important effects on females (Lex et al. 1991). Although the sample used in this study was quite small, it noted that 75% of third DWI offenders had family members with a history of alcoholism.

A study of 812 female DWI offenders enrolled in the New York Drinking Driver program in 1992 with alcohol dependency problems were also more likely to report a family member with alcohol or drug problems. Furthermore, 47% of the dependent group more often had a relative that had also been

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9 This study involved 1030 personally interviewed female-female twin pairs identified from the Virginia Twin Registry and born between the years 1934 and 1971. The study further noted that the “prevalence, age of onset, clinical features, course and outcome of alcoholism differ substantially in men and women” (Kendler et al. 1992, p.1877).

arrested for DWI than the abuse group (28%) or non-diagnosis group (20%) (Parks et al. 1996).

Similarly, close contact with family members who possessed problems with alcohol was associated with a higher risk for alcohol problems among female DWI offenders, as well as an increased recidivism risk (Lapham et al. 2000).

A study on parental influences on driving while impaired (term used in study) among adolescents between the ages of 11 and 19 found similarities across gender in predictors of DWI. They found that for both females and males, impaired driving was significantly associated with having a parent who reported alcohol use. Further, it was found that peer alcohol use predicted impaired driving when parents did not report drinking alcohol. However, when parents did report alcohol use, peer alcohol use did not predict impaired driving (Maldonado-Molina et al. 2011).

There is also some research to suggest that quite a wide variety of family situations can contribute to the reasons for drinking among female drunk drivers. Women more frequently than men reported drinking to help sort out family problems and personal issues. In contrast to men who drank heavily in social situations, women who drank heavily tend to do it alone as a coping mechanism (Walitzer and Dearing 2006; White and Hennessey 2006).

Many female DWI offenders, who were admitted to addiction treatment, had multiple factors that contributed to their alcohol consumption. These factors included: a history of alcoholism within the family, experience with abuse (physical and sexual), anxiety and depression, and family and personal relationships that encouraged heavy drinking (White and Hennessey 2006). For this reason, it is important to acknowledge that a range of factors associated with an offender's family history must be considered as part of any intervention to ensure the constellation of factors contributing to offending are addressed.

Some researchers have concluded that it is difficult to determine how these experiences are connected to female driving behaviors. It is possible that family history of alcohol problems and drinking and driving may encourage young females to drive more cautiously because they are more familiar with potential consequences associated with risky and/or drunk driving (Farrow and Brissing 1990). While strained family situations may produce emotional stress that contributes to increased substance use (alcohol and/or drugs)

among young females, it may not negatively influence their driving behaviors in the future (Farrow and Brissing 1990).

It appears that a constellation of family factors are associated with female DWI offending to varying extents, however, the specific influence of each factor is unclear. More research is needed to increase understanding of the role of these factors in relation to drunk driving among women and to draw meaningful conclusions.

## 4.6 DWI recidivism

Repeat drunk driving offenders pose a significant threat to safety, as they often persist in their drinking and driving behavior, even once their driver's license has been suspended or revoked (McCartt et al. 2003; Griffin and DeLaZerda 2000). More importantly, their persistent drinking and driving behaviors are more likely to result in fatal and serious injury crashes (Simpson and Mayhew 1991). For example, an estimated 35-40% of all fatally injured alcohol impaired drivers (both male and female) had prior DWI arrests (Lapham et al. 2000).

Historically, past efforts to identify drunk drivers at high risk of re-offending focused on males as they accounted for a majority of DWI offenders (Lapham et al. 2000). Indeed, most studies of DWI recidivists conclude that more than 90% of recidivists are male (Jones and Lacey 2001). These offenders are usually under age 40, have low levels of education and income, and are frequently single. They also tend to have a history of prior DWI and/or other offenses. These offenders also have higher levels of anti-social behaviors in addition to personality or psychosocial problems (Jones and Lacey 2001; Simpson et al. 2004).

Alcohol problems are also common among this population. In a study of 818 fatally injured drivers (gender not indicated) in the U.S., approximately 45% of them had a positive BAC. The study revealed that:

- > Between 21% and 61% were problem drinkers (depending on the indicator variable used);
- > Between 22% and 57% were problem drinkers based on spousal reports (the two strongest markers); and,

- > “Drivers with very high BACs were far more likely to be described as having histories suggestive of problem drinking than other fatally injured drivers” (Baker et al. 2002, p. 225).

Conversely, few female DWI arrestees had a prior record, and it has been noted by older studies that once arrested, women were less likely to repeat their offense (Argeriou 1986; Wells Parker et al. 1991; Jones and Lacey 2001). Wells-Parker et al. (1991) found males to be twice as likely to recidivate as females in a follow-up study of 3,425 DWI offenders. Other studies have similarly reported a lower risk of recidivism among female DWI offenders as compared to males (Webster et al. 2009; McMurrin et al. 2011).

Despite the fact that there is a smaller number of female DWI offenders, and hence, a smaller number of female DWI offenders who recidivate which makes this population more difficult to study, there are some data that shed light on the profile of repeat female DWI offenders. According to Argeriou et al. (1986) both male and female repeat offenders share similar characteristics, as do their first offender counterparts. However, repeat offenders of both genders more frequently drink and exhibit higher levels of impairment due to their consumption of alcohol. In addition, a greater proportion of them abuse drugs, use alcohol treatment services more often, and has access to fewer economic resources.

In the early 1980s in Kansas, a study of 619 female DWI offenders reported that 46 of these women were arrested more than once. Over a five year period, the majority of these offenders (39 of the 46) were subsequently arrested two or more times. It was further noted that the majority of these women (76.7%) were single, divorced, or widowed; and just 23.3% were married or co-habiting. In addition, approximately half of female recidivists were unemployed compared to 33% of non-recidivists (Shore and McCoy 1987).

The study also noted that the average age of female DWI recidivists in this study was about 30 years old; almost half (47.8%) of recidivists were in their twenties; 23.9% of recidivists were in their thirties; and 17.4% of recidivists were in their forties (Shore and McCoy 1987).

A five year follow-up of 2,615 first DWI offenders in New Mexico by Lapham et al. (2000) revealed that 26% of offenders had been re-arrested (20% of females and 33% of males) and age was only a predictor of recidivism

among younger males. They further reported that, after controlling for a range of demographic factors, that young males had a recidivism rate 2.5 times that of women, however, a comparison of rates among older offenders revealed few differences between genders. Laplante et al. (2008) reported that, in particular, female repeat DWI offenders, compared to males, have higher levels of psychiatric morbidity.

Recent research has noted that a large number of females are arrested each year for a second DWI offense. For example, between 2000-2007 18.3% of DWI offenders in New Mexico who were re-arrested were females (NMDH 2009).

Most notably, a 2010 study by Rauch et al. examined the rates of conviction for an alcohol impaired driving violation of approximately 21 million Maryland drivers between 1999 and 2004. Drivers were grouped according to the number of prior offenses (0, 1, 2, and 3+). Results revealed that the risk of recidivating was equal among males and females following their first conviction. It was also reported that, not only did males have a much higher overall rate of being arrested for impaired driving relative to females, the proportion of female arrested drivers declined significantly as the level of prior violations increased. To illustrate, while females accounted for 51% of the drivers with no prior violations, they accounted for just 8% of those with three or more violations.

In summary, there is a much smaller number of female DWI offenders who recidivate, and these offenders often share similar characteristics to their male counterparts with minor differences. Available data suggest recidivism risk may be higher for young males than women (Argeriou et al. 1986; Jones and Lacey 2001; McMurrin et al. 2011; Webster et al. 2009; Wells-Parker et al. 1991), but it appears that risk of recidivism may converge as adults of both genders age (Rauch et al. 2010). Few studies have been conducted to examine this issue and more research is needed.

## 4.7 Other offending behavior

Research spanning the 1980s and 1990s has examined linkages between drivers with a variety of high risk driving offenses, including drunk driving. Outcomes of these studies have demonstrated that there is a correlation between previous arrests for high-risk driving behaviors and drunk driving, and of certain other crimes, and concluded that the presence of prior traffic

offenses and certain other crimes is a significant predictor of recidivism (Caldwell-Aden et al. 2009). This population is sometimes referred to as “the high risk driver”; research also suggests that this population also may have antisocial characteristics (Beirness and Simpson 1997; Donovan et al. 1988; Gebers and Peck 2003; Peck 1993; Wilson 1991).

There have also been a limited number of studies that examine the criminal history of DWI offenders; available research focuses almost exclusively on males who are more likely to re-offend than females. It is also well established that two important factors that contribute to DWI offending are the consumption of alcohol and antisocial behaviors.

Most recently, a study was conducted to analyze the past criminal histories of first DWI offenders (male and female) in California (CA), Florida (FL) and New York (NY) in order to gauge whether there were common prior offenses among those arrested for DWI for the first time. State analyses consistently revealed that between 26% and 44% of offenders had previously been engaged in criminal activities prior to their DWI arrest. Two of these states (CA and FL) included traffic offenses and reported that more than one in three people had a prior arrest history for other offenses at the time of their first DWI arrest (Caldwell-Aden et al. 2009).

Results of this study revealed that drug offenses, assault, and theft offenses were the most common reasons for arrests<sup>10</sup> prior to the DWI offense among those with criminal histories in these states, and between 45% and 85% of those with a prior arrest had also been arrested for at least one of these three offenses. Not surprisingly, traffic offenses were also common among this population as 8-12% of those first DWI offenders in CA and FL had also been arrested for traffic offenses before their first arrest for drunk driving (Caldwell-Aden et al. 2009).

Authors of this study further note that there was limited demographic information available about this population in New York and California, however it was reported that a majority of offenders (70%) were under age 40 and were predominantly male. Hence, this study provides limited insight into the prior criminal history of female DWI offenders specifically. Of interest, 33% of female first DWI offenders in CA had a prior arrest as compared to almost 44% of males; in contrast, in New York 80% of the sample was

<sup>10</sup> Assault, drugs, theft and traffic offenses are common reasons for arrests among the general population as well.

male and 29% were more likely to have a prior arrest relative to just 16% of females (Caldwell-Aden et al. 2009).

More generally, recent research has established that women offenders generally differ from men in terms of personal history and pathways to crime. For example, female offenders are more likely to be the primary caretaker of children at the time of arrest, more likely to have experienced abuse, and more likely to have physical and mental health needs (Bloom et al. 2003). For this reason, a multidimensional approach must be considered when evaluating and implementing treatment and sanctioning programs for female offenders.

## 4.8 Summary

Research examining the characteristics of drunk drivers has addressed a range of different dimensions in an effort to better understand drunk driving behavior. For the most part, the profile of a female DWI offender differs somewhat from that of a male offender, yet they also share some common characteristics.

Research suggests that a substantial proportion of female DWI offenders are experiencing substance abuse problems, and the gravity and complexity of those problems is not insignificant (White and Hennessey 2006).

There are some data to inform our understanding of the role of age in relation to drunk driving among females. Older studies have reported that the average age of female first DWI offenders is about 31 years (Parks et al. 1996; Shore and McCoy 1987), and more recent data are not available. Generally, rates of involvement decrease with age (Peck et al. 2008), and the population of greatest concern is often young females. To illustrate, an increase in involvement in alcohol involved fatal crashes among female drivers aged 19 to 20 and 20 to 24 was noted between 1995 to 2007 (Tsai et al. 2010). The increasing involvement of young women with alcohol, in combination with their inexperience driving and their growing propensity for risky driving warrants our attention.

Findings in the literature regarding levels of education and employment among female DWI offenders are mixed. Research into the marital status of female drunk drivers has produced more consistency showing a significant proportion of female drunk drivers are single, divorced or separated, or more likely to be living with a partner with an alcohol problem (Argeriou et al.

1986; Chang et al. 1996; Greenfield 2002; Lapham et al. 2000; McMurrin et al. 2011; Shore and McCoy 1987).

Study findings indicate that there is a need to treat part of the female drunk driver population, not only for alcohol misuse problems, but also mental health problems as female DWI offenders have significantly higher psychiatric morbidity relative to their male counterparts (Laplante et al. 2008). Female DWI offenders also diverge more from the general population than males in terms of overall psychiatric morbidity (Lapham et al. 2001). Furthermore, the use of drugs appears to be somewhat more common among female DWI offenders (Maxwell 2011; Maxwell and Freeman 2007), and the use of drugs varies by type of drug (e.g., cannabis is more common among males; narcotics are more common among females).

The family history of female DWI offenders is also an important consideration. Among third DWI offenders a history of alcoholism in the family was more common, although this study was small (Lex et al. 1991). Many female DWI offenders, who were admitted to addiction treatment, had multiple factors that contributed to their alcohol consumption (White and Hennessey 2006).

Studies have reported a lower risk of recidivism among female DWI offenders as compared to males (McMurrin et al. 2011; Webster et al. 2009; Wells Parker et al. 1991). Female repeat offenders often share similar characteristics to their male counterparts with minor differences (Argeriou 1986). However, following their first conviction for impaired driving, the risk of recidivism is as pronounced among females as it is among males and among older females (Rauch et al. 2010). Hence, research findings pertaining to the prevalence of recidivism are somewhat mixed. Additional research is needed to better understand the risk of recidivism among female DWI offenders at different ages, relative to their male counterparts.

There is also one limited study to suggest that a not insignificant proportion of female first DWI offenders may have a history of prior traffic or other criminal offenses. Common criminal offenses may include drug charges, theft and assault (Caldwell-Aden et al. 2009).

Finally, female offenders in general are more likely to be the primary caretaker of children at the time of arrest, more likely to have experienced abuse, and more likely to have physical and mental health needs (Bloom et al. 2003).



## 5. INVOLVEMENT OF FEMALE DRIVERS TESTING POSITIVE FOR ALCOHOL IN FATAL CRASHES

Research shows that men are generally more likely to drive while drunk compared to women (Waller 1997; Simpson and Mayhew 1991; Jones and Lacey 2001). A closer examination of national data from the U.S. FARS for the years 2005 through 2009 shows that the percentage of male drivers with a positive BAC involved in a fatal crash (29%) is much greater than the percentage of females (16%) with a positive BAC.

Research has also suggested that the number of women involved in drinking and driving crashes has been incrementally increasing in recent years (NHTSA 2009a; Popkin 1991; Popkin et al. 1988). For example, an analysis of FARS data showed that the number of female drivers with a BAC of .08 or higher in 15 states increased or was unchanged in 2008 compared to 2007, whereas this was only true for males in 13 states (NHTSA 2009a). However, an analysis of FARS data including all U.S. jurisdictions from the past five years reveals that the total number of females involved in fatal crashes in general has been decreasing during this time period (from 15,059 in 2005 to 11,825 in 2009). Other research has similarly shown that alcohol impaired fatalities (involving both males and females) have also generally declined from 16,885 in 2005 (NHTSA 2006) to 10,839 in 2009 (NHTSA 2009b). An examination of the percentage of fatal crashes involving female drivers testing positive for alcohol revealed that it has remained relatively stable during this period; there was a slight decrease from 18% in 2005 to 16% in 2006 through to 2009. Thus, the number of female drivers involved in all fatal crashes in general has

been decreasing; however, the percentage of females with a positive BAC in fatal crashes has remained stable. This section further elaborates on these findings by analyzing FARS data for female drivers testing positive for alcohol in fatal crashes.

## 5.1 Methods

To determine the magnitude and characteristics of the drinking and driving problem among females, an operational definition of the problem was established to guide the analyses. For the purposes of this analysis, an alcohol positive driver was defined as a driver who had a positive BAC (.01+) at the time of the fatal crash, or who refused to provide a breath sample. A drunk driver was defined as a driver with a BAC above the per se limit (.08+) or who refused to provide a breath sample. Finally a sober driver was defined as a driver with a zero BAC.

Among alcohol positive drivers, crash characteristics were also examined for different levels of BAC. Levels of BAC were divided into three groups. The first group includes drivers with low BACs between .01 and .07, the second, drivers with a positive BAC between .08 and .15. Finally, the third group includes high BAC alcohol positive drivers who had a BAC of .16 or above or refused to provide a breath sample at the time of the fatal crash.

The characteristics of fatal crashes involving alcohol positive female drivers were investigated using FARS data from NHTSA. The FARS data system documents fatal crashes occurring within the 50 states, the District of Columbia, and Puerto Rico. This FARS database, which is essentially a census of all fatal crashes occurring on public roads in the U.S., was downloaded from the NHTSA website (<http://www-fars.nhtsa.dot.gov/>). Five years of national data were used from 2005 through to 2009 (2009 is the most recent year for which FARS data were available).

The FARS database contains three principle files, namely the Accident, Vehicle, and Person files. These files include information about the crash (e.g., road characteristics, time, weather), the vehicles involved (e.g., type of vehicle, year of manufacture), and the persons involved (e.g., age, gender, belt use, driver condition). Also included in the Person file are driver record data on previous collisions, offenses, and suspensions in the three years prior to the fatal collision.

Alcohol data in FARS is often missing due to the low testing rates of fatally injured drivers in many jurisdictions. To address this limitation, NHTSA relies upon Rubin's multiple imputation process to create sound statistical estimates for the missing BAC values. NHTSA uses a variety of characteristics including police-reported drinking, age, gender, restraint use, type of crash, time of day, and driver of striking or struck vehicle to determine a distribution of alcohol consumption for each missing data point. The distribution of possible BAC values (10 for each missing BAC value) is then used in the analyses. In other words, it is as if the analyses are conducted ten times, each time replacing the missing BAC value with a replacement value coming from the distribution of possible BAC values. This multiple imputation method summarizes the results for each of the ten data runs into one single result, comparable to the outcome of a normal analysis. The multiple imputation files were merged with the Accident, Vehicle, and Person files to form one database for the purposes of this project.

Analyses were performed by TIRF using the StataCorp (2010) Statistical Software, release 11. Bivariate analyses were conducted comparing the alcohol positive female driver definitions to other female drivers with regard to various fatal collision characteristics. It should be noted that for a number of variables, the categories were combined to simplify the presentation of the results. The focus of the analyses was on those collisions where one or more drivers or occupants were killed.

First, analyses of crash characteristics at the national level were performed for all alcohol positive female drivers (BAC of .01+ or refused to provide a breath sample) compared to drunk (BAC of .08+ or refused to provide a breath sample) and sober drivers (zero BAC). Second, analyses of crash characteristics at the national level were performed for each of the three different levels of BAC (.01-.07; .08-.15; .16+ or refused) at the time of the fatal crash in relation to female sober drivers with no evidence of alcohol. This was followed by analyses of the crash characteristics of alcohol positive female drivers with a BAC above .01+ or refused to provide a breath sample compared to sober drivers with zero BAC in one state from each region according to the U.S. Census Bureau divisions (Northeast, Midwest, South, and West). Each state chosen had to be sufficiently large to perform the analyses using multiple imputation data, and equal representation with regards to rural and urban areas was also considered in the selection of specific states for these analyses.

The final states chosen were Ohio (Midwest), New Jersey (Northeast), Texas (West/South) and Florida (South).

## 5.2 Crash analysis

### 5.2.1 National results

This section describes the FARS data analyses of the crash characteristics of alcohol positive female drivers involved in a fatal crash compared to sober female drivers involved in a fatal crash. Data from all jurisdictions contained in FARS were included in the analyses.

#### 5.2.1.1 Alcohol positive female drivers versus female sober drivers in fatal crashes

The first three tables in this section present the percentage of drivers in fatal crashes who had a positive BAC at the time of the fatal crash, or refused to provide a breath sample. Note that this definition includes both high and low BAC values, so drivers with any amount of alcohol present at the time of the fatal crash were included as an alcohol positive driver in these analyses. Throughout this section the focus is on alcohol positive female drivers in relation to female sober drivers. However, results of these analyses are shown next to the results from an analysis of alcohol positive male drivers in relation to sober male drivers to provide context and to facilitate gender comparisons. The fourth table in this section presents the FARS analyses of driver characteristics with zero BAC (sober drivers) compared to drivers with a BAC above .01 or refused to provide a breath sample (alcohol positive drivers) and drivers with a BAC above the illegal per se limit of .08 or who refused to provide a breath sample (drunk drivers).

Table 1 shows the percentage of alcohol positive drivers in fatal crashes by gender for the years 2005 to 2009 combined. These results clearly illustrate that out of all drivers involved in fatal crashes and positive for alcohol, there are more male drivers (84%) than female drivers (16%).

TABLE 1: ALCOHOL POSITIVE DRIVER BY GENDER (2005-2009)

Gender	Sober driver	Alcohol positive
Male	70.88%	83.57%
Female	29.12%	16.43%
Total %	100.00%	100.00%
Total	195,834	68,223

Table 2 shows the percentage of alcohol positive drivers compared to sober drivers in fatal crashes for each gender separately for the years 2005 to 2009 combined. These results illustrate that of all males in fatal crashes, 29% have a positive BAC compared to 16% among female drivers involved in a fatal crash.

TABLE 2: GENDER BY ALCOHOL POSITIVE DRIVER (2005-2009)

Gender	Male	Female
Sober driver	70.86%	83.55%
Alcohol positive	29.14%	16.45%
Total %	100.00%	100.00%
Total	196,177	68,363

Table 3 below shows the percentage of alcohol positive female drivers involved in fatal crashes by year. It appears that the percentage of females who had a positive BAC at the time of the collision was highest in 2005 at almost 18%, dropped to 16% in 2006 and remained relatively stable throughout 2007, 2008 and 2009. It should be noted that the total number of fatal crashes involving females in general has been decreasing from 15,059 in 2005 to 11,825 in 2009. In comparison the percentage of males who had a positive BAC at the time of the collision was lowest in 2005 at 28%, increased to 29% in 2006 and 2007 and increased again to 30% in 2008 and 2009. The total number of fatal crashes involving males in general, as with females, has also decreased from 43,282 in 2005 to 32,807 in 2009.

TABLE 3: ALCOHOL POSITIVE DRIVER BY YEAR AND GENDER

Alcohol positive driver	2005		2006	
	Male	Female	Male	Female
No	71.68%	82.01%	71.16%	84.15%
Yes	28.32%	17.99%	28.84%	15.85%
Total %	100.00%	100.00%	100.00%	100.00%
Total	43,282	15,059	42,223	14,753

Alcohol positive driver	2007		2008		2009	
	Male	Female	Male	Female	Male	Female
No	70.68%	84.15%	70.48%	84.32%	70.04%	83.52%
Yes	29.32%	15.85%	29.52%	15.68%	29.96%	16.48%
Total %	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total	40,804	14,099	37,061	12,627	32,807	11,825

Table 4 shows the crash characteristics of alcohol positive drivers, drunk drivers and sober drivers in fatal crashes for both females and males. Note that percentages for the categories of alcohol positive, drunk and sober drivers do not add up to 100%, as it is the total percentage of the collision characteristics that will add up to 100%. For example, of all females in fatal crashes who were alcohol positive drivers (.01+ BAC) 61% were involved in single vehicle collisions and 39% (not shown in table) were involved in multiple vehicle collisions. As can be seen in Table 4, overall, there is little difference between alcohol positive drivers and drunk drivers above .08. There is also little difference between female and male alcohol positive and drunk drivers involved in fatal crashes. Comparable results for males are only discussed when the differences between males and females were pronounced (defined as at least a 5% difference between males and females). However, there are many differences between alcohol positive and drunk drivers compared to sober drivers, and these differences are apparent for both males and females.

TABLE 4: KEY CHARACTERISTICS BY GENDER OF SOBER DRIVERS, ALCOHOL POSITIVE DRIVERS AND DRUNK DRIVERS

Key Characteristics	Sober driver (0 BAC)		Alcohol positive (.01+ BAC)		Drunk driver (.08+ BAC)	
	Male	Female	Male	Female	Male	Female
Single vehicle	30.89%	28.87%	65.76%	60.60%	67.20%	62.04%
Angle impact	32.61%	35.91%	14.07%	16.14%	13.14%	15.10%
Rural area	54.64%	53.54%	56.21%	56.08%	56.13%	55.79%
Drivers aged 21-34	26.22%	26.42%	43.67%	41.10%	44.28%	41.61%
Unbelted drivers	26.12%	19.99%	61.20%	52.31%	62.47%	53.46%
Drugs as contributing factor	10.00%	9.97%	53.01%	48.36%	53.95%	49.03%
Cannabinol	2.59%	1.30%	6.77%	5.59%	6.29%	5.27%
Stimulants	1.98%	1.55%	5.02%	4.75%	4.60%	4.31%
Other drugs	4.42%	4.76%	7.18%	8.86%	6.31%	8.10%
Speeding	13.17%	8.98%	32.52%	24.71%	33.22%	25.45%
Not properly licensed	10.54%	6.42%	27.07%	16.96%	27.58%	17.24%
Passengers present	31.34%	41.04%	32.25%	37.77%	31.72%	36.61%
Drowsy	1.80%	1.47%	1.80%	1.53%	1.46%	1.67%
Previous collision	13.62%	11.57%	14.50%	14.48%	14.36%	14.51%
Previous DWI	1.58%	0.75%	7.91%	9.11%	8.28%	5.07%
Previous speeding	20.31%	14.12%	23.31%	20.55%	23.07%	20.62%
Previous other	18.25%	10.47%	22.14%	16.96%	22.01%	16.96%
Previous suspension	10.90%	6.73%	24.92%	18.21%	25.29%	18.54%
Sat-Sun collision	28.33%	27.70%	47.30%	42.99%	47.68%	43.00%
Night time (9pm-5:59am)	22.49%	17.45%	60.10%	56.83%	61.76%	57.65%

The results reveal that alcohol positive and drunk female drivers were more commonly involved in single vehicle collisions (61% and 62%) compared to sober female drivers (29%), and alcohol positive and drunk female drivers were less often involved in angle impact collisions (16% and 15% vs. 36%). There was little difference in terms of whether the fatal crash occurred in a rural area between alcohol positive female drivers (56%), drunk female drivers (56%) and sober female drivers (53%). Alcohol positive female drivers and female drunk drivers involved in fatal crashes were more often aged 21-34 (41% and 42% vs. 26%). Alcohol positive and drunk female drivers also wore seat belts less often (48% and 47%) than sober female drivers (80%).

Almost five times as many alcohol positive and drunk female drivers involved in fatal collisions were considered by police to have been using drugs (48% and 49%) as compared to sober female drivers (10%). In terms of specific drug test results at the time of the fatal crash, alcohol positive and drunk female drivers more often tested positive for stimulants (5% and 4% vs. 2%), cannabinal (6% and 5% vs. 1%), and other drugs (9% and 8% vs. 5%) than female sober drivers.

With regards to speeding at the time of the fatal crash, more alcohol positive and drunk female drivers were considered by police to have been speeding (i.e., exceeding the speed limit, racing, or going too fast for conditions) at the time of the fatal crash than sober female drivers (25% and 25% vs. 9%). Not having a valid driver's license at the time of the fatal collision was almost three times more common among alcohol positive (17%) and drunk female drivers (17%) compared to sober female drivers (6%). The difference was even more pronounced for males (27% and 28% vs 11%). There was little difference between alcohol positive and drunk female drivers compared to sober female drivers in terms of whether passengers were present at the time of the fatal crash (38% and 37% vs. 41%). This difference was smaller for male drivers (32% and 32% vs. 31%).

Driver history within the last three years prior to the fatal crash was also examined. For those who were involved in one or more previous collisions, there was little difference between alcohol positive female drivers (14%), drunk female drivers (15%) and sober female drivers (12%). With regards to females who had been previously convicted of DWI, the percentage of alcohol positive female drivers was higher (9%) and the percentage of drunk female drivers (5%) was somewhat higher than that of sober female drivers

(0.75%). Alcohol positive and drunk female drivers more commonly had a previous speeding conviction compared to sober female drivers (21% and 21% vs. 14%). For males the difference was much smaller (23% and 23% vs. 20%). Alcohol positive and drunk female drivers also more commonly had other prior traffic convictions (17% and 17%) compared to sober female drivers (10%). Again, this difference was less pronounced for males (22% and 22% vs. 18%). Finally, alcohol positive and drunk female drivers more commonly had a previous license suspension (18% and 19%) compared to sober female drivers (7%). For male drivers, this difference was larger (25% and 25% vs. 11%).

Fatal collisions involving alcohol positive and drunk female drivers were more common on Saturdays and Sundays (43% and 43%) than was the case for sober female drivers (28%). Approximately 57% of alcohol positive female drivers and 58% of drunk female drivers were involved in fatal collisions at night (9:00pm-5:59am), compared to 17% for sober female drivers. For males, this difference was larger (60% and 62% vs. 22%). Time of year was also examined; however no differences between alcohol positive, drunk and sober drivers were found for both females and males.

### **5.2.1.2 Different levels of BAC among alcohol positive female drivers in fatal crashes**

This section presents results of the FARS analyses pertaining to the crash characteristics for alcohol positive female drivers according to different levels of BAC (.01-.07; .08-.15; .16+ or refused) at the time of the fatal crash in relation to female sober drivers with no evidence of alcohol. Comparable results for alcohol positive male drivers in fatal crashes are only discussed when the differences between males and females were pronounced (defined as at least a 5% difference between males and females).

Table 5 shows the crash characteristics of alcohol positive drivers for different levels of BAC. As shown, the higher the BAC of a driver in a fatal crash, regardless of gender, the more likely it is the driver was involved in a single vehicle crash. To illustrate, out of all females in fatal crashes with a BAC between .01 and .07, 47% were involved in single vehicle collisions (29% for females with zero BAC). However of all female drivers in fatal crashes with a BAC between .08 and .15, 59%, were in single vehicle collisions and of all female drivers with a BAC above .16 or who refused a breath test 66% were involved in single vehicle collisions. The pattern for males is comparable,

although more pronounced (31% for zero BAC followed by 53%, 64%, and 71% respectively). In terms of the manner of collision, the higher the BAC of the driver in a fatal crash whether male or female, the less likely it is the fatal crash was an angle impact crash. More specifically, out of all female drivers with a BAC between .01 and .07, 25% were involved in angle impact collisions (36% for females with zero BAC). This percentage was lower for alcohol positive female drivers with a BAC between .08 and .15 (17%), and even lower for female drivers with a BAC above .16 or who refused a breath test (12%). The pattern for males is comparable (33% for zero BAC followed by 22%, 16% and 11% respectively). There was little difference across levels of BAC in terms of whether the fatal crash occurred in a rural or urban area and this was true for both males and females.

**TABLE 5: KEY CHARACTERISTICS BY POSITIVE BAC LEVEL OF DRIVER AND GENDER**

Key Characteristics	BAC=0		BAC=.01-.07		BAC=.08-.15		BAC=.16+/ refused	
	Male	Female	Male	Female	Male	Female	Male	Female
Single vehicle	30.89%	28.87%	52.66%	46.79%	63.84%	59.19%	71.01%	66.41%
Angle impact	32.61%	35.91%	21.74%	25.21%	15.82%	16.93%	10.62%	12.42%
Rural area	54.64%	53.54%	54.43%	55.34%	54.36%	54.69%	57.91%	57.30%
Drivers aged 21-34	26.22%	26.42%	39.15%	37.74%	44.58%	41.46%	44.51%	42.04%
Unbelted drivers	26.12%	19.99%	48.39%	38.24%	57.14%	47.89%	67.66%	60.27%
Drugs as contributing factor	10.00%	9.97%	39.92%	34.61%	52.17%	47.18%	57.58%	53.98%
Cannabinol	2.59%	1.30%	7.58%	5.40%	6.44%	5.34%	6.73%	5.83%
Stimulants	1.98%	1.55%	5.95%	5.46%	4.43%	4.24%	5.11%	4.85%
Other drugs	4.42%	4.76%	10.06%	9.87%	6.46%	7.38%	6.73%	9.52%
Speeding	13.17%	8.98%	25.81%	17.34%	32.48%	24.18%	34.61%	27.65%
Not properly licensed	10.54%	6.42%	22.87%	14.22%	26.14%	16.58%	28.95%	18.17%
Passengers present	31.34%	41.04%	37.40%	47.21%	38.26%	42.90%	26.91%	30.93%
Drowsy	1.80%	1.47%	2.02%	2.25%	1.44%	1.82%	1.42%	1.52%
Previous collision	13.62%	11.57%	15.15%	13.60%	15.00%	14.29%	13.99%	14.92%

Key Characteristics	BAC=0		BAC=.01-.07		BAC=.08-.15		BAC=.16+/ refused	
	Male	Female	Male	Female	Male	Female	Male	Female
<b>Previous DWI</b>	1.58%	0.75%	4.71%	2.53%	6.57%	3.37%	9.74%	6.66%
<b>Previous speeding</b>	20.31%	14.12%	24.23%	18.84%	24.79%	20.60%	22.09%	21.11%
<b>Previous other</b>	18.25%	10.47%	22.11%	15.47%	22.86%	16.93%	21.69%	17.50%
<b>Previous suspension</b>	10.90%	6.73%	21.03%	14.15%	24.22%	16.98%	26.57%	20.46%
<b>Sat-Sun collision</b>	28.32%	27.70%	44.46%	43.04%	47.81%	44.85%	47.85%	41.70%
<b>Night time (9pm-5:59am)</b>	22.49%	17.44%	47.87%	47.96%	60.66%	56.80%	63.56%	59.97%

As BAC levels rise from below .08 to above .08, the more likely it is for the driver to be between the age of 21 and 34. To illustrate, of all females in fatal crashes with a BAC between .01 and .07, 38% of female drivers were aged 21-34 (26% for female drivers with zero BAC). This percentage was somewhat higher among female drivers in fatal crashes with a BAC between .08 and .15 (42%) and female drivers with a BAC above .16 or who refused a breath test (42%). The same pattern was noted for males (26% for zero BAC followed by 39%, 45% and 45% respectively). As for the non-use of restraints (either not using a seat belt or not wearing a helmet), the higher the BAC of a driver in a fatal crash, regardless of gender, the more likely it is that they are not wearing a restraint. More precisely, out of all females in fatal crashes with a BAC between .01 and .07, 38% were unbelted (20% for female drivers with zero BAC). This percentage increases to 48% among female drivers in fatal crashes with a BAC between .08 and .15 and to 60% for female drivers with a BAC above .16 or who refused a breath test. The same pattern was noted for males, but with higher percentages (26% for zero BAC followed by 48%, 57%, and 68% respectively).

As BAC levels of drivers increase in fatal crashes, the more likely it is that the drivers were considered by police to have been using drugs. To illustrate, of all females in fatal crashes with a BAC between .01 and .07, more than a third (35%) were considered by police to have been using drugs (10% for female drivers with zero BAC). Again, this percentage increases to 47% for female drivers in fatal crashes with a BAC between .08 and .15 (47%) and

to 54% for female drivers with a BAC above .16 or who refused a breath test. The same pattern was noted for males, but with higher percentages (10% for zero BAC followed by 40%, 52% and 58% respectively). In terms of specific drug test results at the time of the fatal crash, there was little difference across levels of BAC, or between males and females.

With regards to speeding, the higher the BAC of the driver in the fatal crash, the more likely it is the driver was considered by police to have been speeding (i.e., exceeding the speed limit, racing, or going too fast for conditions) at the time of the fatal crash. Specifically, of all females with a BAC between .01 and .07, 17% were considered by police to have been speeding at the time of the fatal crash (9% for female drivers with zero BAC). This percentage increases to 24% for female drivers in fatal crashes with a BAC between .08 and .15, and to 28% for female drivers with a BAC above .16 or who refused a breath test. These percentages were higher for males with a comparable pattern (13% for zero BAC followed by 26%, 32%, and 35% respectively).

As BAC levels of drivers increase in fatal crashes, it becomes somewhat more likely that the driver did not have a valid driver's license at the time of the fatal crash. To illustrate, the percentage of female drivers with a BAC between .01 and .07 who did not have a valid driver's license at the time of the fatal collision was 14% (6% for female drivers with zero BAC). This percentage increases to 17% for female drivers with a BAC between .08 and .15 and to 18% for female drivers with a BAC above .16 or who refused a breath test. Again, the same pattern was noted for males, but the percentages were higher (11% for zero BAC followed by 23%, 26%, and 29% respectively). In terms of whether passengers were present at the time of the fatal crash, as BAC levels of drivers increase, it is less likely that drivers had passengers in the vehicle. More precisely, the percentage of female drivers with a BAC between .01 and .07 who had passengers in the vehicle was 47% (41% for female drivers with zero BAC). This percentage decreases to 43% for female drivers with a BAC between .08 and .15 and decreases to 31% for female drivers with a BAC above .16 or who refused a breath test. The percentages for males were lower with a different pattern (31% for zero BAC followed by 37%, 38%, and 27% respectively).

As for driver history within three years of the fatal crash, particularly those who were involved in one or more previous collisions, there was little difference across levels of BAC for females and little difference compared

to males. With regards to females who had been previously convicted of DWI on one or more occasions, as BAC levels of drivers increase to higher levels, the more likely it is that the driver had a previous DWI conviction. To illustrate, of all female drivers in a fatal crash with a BAC between .01 and .07, 3% had a previous DWI conviction. This percentage was also 3% for female drivers with a BAC between .08 and .15 (0.8% for females with zero BAC). However, of all female drivers in a fatal crash with a BAC above .16 or who refused a breath test 7% had a previous DWI conviction. The pattern for males was somewhat similar with a more gradual increase (2% for zero BAC followed by 5%, 7%, and 10% respectively). In terms of previous speeding convictions, there was little difference across levels of BAC for both female and male drivers. The same was true for previous other convictions.

In regard to previous license suspensions within the last three years prior to the fatal collision: of all female drivers in fatal crashes with a BAC between .01 and .07, 14% had a previous license suspension compared to 17% for female drivers with a BAC between .08 and .15 and 20% for female drivers with a BAC above .16 or who refused a breath test (7% for females with zero BAC). A comparable pattern was noted for males, but percentages were higher (11% for zero BAC followed by 21%, 24%, and 27% respectively).

Fatal collisions occurring on Saturdays and Sundays were just as common across levels of BAC and were similar to those of males. As levels of BAC among drivers increase, the more likely it is that the fatal collision occurred at night (9:00pm-5:59am). To illustrate, of all females in fatal crashes with a BAC between .01 and .07, 48% occurred at night compared to 57% for female drivers with a BAC between .08 and .15, and 60% for female drivers with a BAC above .16 or who refused a breath test (17% for females with zero BAC). The pattern for males is comparable although more pronounced (22% for zero BAC followed by 48%, 61%, and 64% respectively).

### 5.2.2 State results

This section first presents the percentage of alcohol positive female drivers and sober female drivers in fatal crashes according to results from analyses of all jurisdictions included in the FARS data, followed by the presentation of the crash characteristics of alcohol positive and sober female drivers in one state from each region according to the U.S. Census Bureau divisions. Each state selected for analysis had to be sufficiently large to perform the analyses using multiple imputation data and equal representation with regards to rural and

urban areas was also considered in the selection of specific states for these analyses. Note that the national results revealed that there is little difference between alcohol positive drivers with a BAC above .01 and drunk drivers above the legal limit of .08. For this reason, state results are presented only for drivers with a positive BAC or who refused a breath test compared to sober drivers.

Table 6 shows the percentage of alcohol positive female drivers compared to sober female drivers in fatal crashes according to jurisdiction. The column entitled “yes” indicates that alcohol was present or a breath test was refused; the column entitled “no” indicates no alcohol was present. As evident in Table 6 the jurisdiction with the highest percentage of females with a positive BAC was Montana (30%) followed by North Dakota (27%) and Hawaii (26%). The states with the lowest percentage of females with a positive BAC or who refused a breath test at the time of the fatal crash were Utah and Kentucky, both at 10%, and Indiana at 11%. The range across the states for females with a positive BAC or who refused a breath test at the time of the fatal crash is from 10% to 30% – a 20% difference, whereas the range for males is from 15% in Utah to 41% in Rhode Island – a 26% difference. The results for alcohol positive male drivers versus sober male drivers are included for comparison purposes.

**TABLE 6: ALCOHOL POSITIVE DRIVERS IN FATAL CRASHES BY STATE AND GENDER**

States	Female				Male			
	No	Yes	Total %	Total	No	Yes	Total %	Total
AL	85.29%	14.71%	100.00%	1,868	69.51%	30.49%	100.00%	5,101
AK	85.50%	14.50%	100.00%	151	69.94%	30.06%	100.00%	355
AZ	82.84%	17.16%	100.00%	1,771	72.09%	27.91%	100.00%	4,921
AR	85.22%	14.78%	100.00%	1,109	72.19%	27.81%	100.00%	3,048
CA	84.72%	15.28%	100.00%	6,410	73.05%	26.95%	100.00%	18,793
CO	83.25%	16.75%	100.00%	973	70.70%	29.30%	100.00%	2,741
CT	77.41%	22.59%	100.00%	452	67.49%	32.51%	100.00%	1,474
DE	82.74%	17.26%	100.00%	223	68.48%	31.52%	100.00%	627
DC	86.67%	13.33%	100.00%	42	63.30%	36.70%	100.00%	176
FL	84.42%	15.58%	100.00%	5,725	73.83%	26.17%	100.00%	15,810
GA	87.46%	12.54%	100.00%	3,030	76.14%	23.86%	100.00%	7,888
HI	73.56%	26.44%	100.00%	191	60.82%	39.18%	100.00%	621
ID	84.58%	15.42%	100.00%	382	71.24%	28.76%	100.00%	1,161

States	Female				Male			
	No	Yes	Total %	Total	No	Yes	Total %	Total
IL	81.53%	18.47%	100.00%	2,016	68.80%	31.20%	100.00%	5,934
IN	88.48%	11.52%	100.00%	1,507	74.75%	25.25%	100.00%	4,363
IA	87.48%	12.52%	100.00%	636	77.89%	22.11%	100.00%	2,183
KS	84.19%	15.81%	100.00%	732	70.42%	29.58%	100.00%	2,075
KY	89.58%	10.42%	100.00%	1,577	77.10%	22.90%	100.00%	4,372
LA	81.09%	18.91%	100.00%	1,454	65.55%	34.45%	100.00%	4,629
ME	84.30%	15.70%	100.00%	321	72.20%	27.80%	100.00%	819
MD	87.07%	12.93%	100.00%	1,028	73.82%	26.18%	100.00%	3,175
MA	79.02%	20.98%	100.00%	687	66.60%	33.40%	100.00%	1,879
MI	87.22%	12.78%	100.00%	2,022	73.19%	26.81%	100.00%	5,154
MN	85.67%	14.33%	100.00%	834	73.68%	26.32%	100.00%	2,569
MS	78.12%	21.88%	100.00%	1,408	68.19%	31.81%	100.00%	3,844
MO	81.42%	18.58%	100.00%	1,817	67.54%	32.46%	100.00%	4,959
MT	69.64%	30.36%	100.00%	360	64.56%	35.44%	100.00%	1,090
NE	84.36%	15.64%	100.00%	440	72.72%	27.28%	100.00%	1,214
NV	82.21%	17.79%	100.00%	620	72.11%	27.89%	100.00%	1,822
NH	83.81%	16.19%	100.00%	260	71.64%	28.36%	100.00%	664
NJ	84.21%	15.79%	100.00%	1,215	73.86%	26.14%	100.00%	3,449
NM	82.68%	17.32%	100.00%	635	72.38%	27.62%	100.00%	1,873
NY	83.69%	16.31%	100.00%	2,080	72.61%	27.39%	100.00%	6,655
NC	87.74%	12.26%	100.00%	2,846	72.80%	27.20%	100.00%	7,145
ND	72.64%	27.35%	99.99%	193	60.42%	39.58%	100.00%	497
OH	84.28%	15.72%	100.00%	2,274	71.61%	28.39%	100.00%	6,142
OK	85.32%	14.68%	100.00%	1,266	73.70%	26.30%	100.00%	3,705
OR	82.60%	17.40%	100.00%	718	71.08%	28.92%	100.00%	2,133
PA	84.49%	15.51%	100.00%	2,561	70.28%	29.72%	100.00%	7,606
RI	80.42%	19.58%	100.00%	118	58.78%	41.22%	100.00%	345
SC	77.00%	23.00%	100.00%	1,693	60.30%	39.70%	100.00%	4,777
SD	77.33%	22.67%	100.00%	206	67.44%	32.56%	100.00%	714
TN	84.58%	15.42%	100.00%	2,101	71.20%	28.80%	100.00%	5,648
TX	78.73%	21.27%	100.00%	5,578	65.03%	34.97%	100.00%	16,920
UT	89.69%	10.31%	100.00%	445	84.97%	15.03%	100.00%	1,339
VT	81.22%	18.78%	100.00%	123	73.34%	26.66%	100.00%	368
VA	82.67%	17.33%	100.00%	1,425	69.43%	30.57%	100.00%	4,396
WA	80.59%	19.41%	100.00%	852	66.82%	33.18%	100.00%	2,967
WV	85.52%	14.48%	100.00%	587	71.58%	28.42%	100.00%	1,921
WI	78.14%	21.86%	100.00%	1,180	63.44%	36.56%	100.00%	3,404
WY	79.95%	20.05%	100.00%	221	67.38%	32.62%	100.00%	739

Table 7 shows the percentage of alcohol positive female drivers for different levels of BAC (.01-.07; .08-.15; .16+) at the time of the fatal crash in relation to female sober drivers with no evidence of alcohol (the sum of these three categories is equal to the column labeled “Yes” in Table 6 for each state). As evident in this table, the state with the highest percentage of female drivers in fatal crashes with a BAC between .01 and .07 at the time of the fatal crash was Oregon (5%) followed by Rhode Island (4%) and Georgia (4%). The states with the lowest percentage of female drivers meeting this definition were as follows: New Hampshire (1%), Kentucky (2%), and Utah (2%).

Also shown is the percentage of female drivers in fatal crashes with a BAC between .08 and .15. This table reveals that the state with the highest percentage of female drivers who had a BAC between .08 and .15 at the time of fatal crash was Montana (11%), followed by Mississippi (9%), and Hawaii (9%). The states with the lowest percentage of female drivers in this BAC range were Kentucky, Michigan and Utah, all at 4%.

Table 7 also displays the percentage of female drivers involved in fatal crashes with a BAC of .16 or above or who refused a breath test at the time of the fatal crash. The state with the highest percentage of female drivers with a BAC above .16 or who refused a breath test was Montana (18%), followed by North Dakota (16%) and South Dakota (15%). The District of Columbia had the lowest percentage of females drivers involved in fatal crashes with a BAC of .16 or above or who refused a breath test at the time of the fatal crash (4%) followed by Utah (5%), and Iowa (5%).

TABLE 7: ALCOHOL POSITIVE FEMALE DRIVERS IN FATAL CRASHES BY STATE AND BAC

Females						
States	BAC=0	BAC=.01-.07	BAC=.08-.15	BAC=.16+ / refused	Total %	Total # of females in fatal crashes
AL	85.29%	2.27%	5.35%	7.09%	100.00%	1,868
AK	85.50%	3.71%	4.64%	6.15%	100.00%	151
AZ	82.84%	2.99%	5.77%	8.40%	100.00%	1,771
AR	85.22%	2.70%	5.09%	6.99%	100.00%	1,109
CA	84.72%	2.82%	5.29%	7.17%	100.00%	6,410
CO	83.25%	2.67%	4.98%	9.10%	100.00%	973
CT	77.41%	3.19%	6.15%	13.25%	100.00%	452
DE	82.74%	2.56%	4.71%	9.99%	100.00%	223
DC	86.67%	3.81%	5.71%	3.81%	100.00%	42
FL	84.42%	2.96%	5.25%	7.37%	100.00%	5,725
GA	87.46%	1.88%	4.56%	6.10%	100.00%	3,030
HI	73.56%	4.24%	8.95%	13.25%	100.00%	191
ID	84.58%	2.17%	5.71%	7.54%	100.00%	382
IL	81.53%	3.53%	6.22%	8.72%	100.00%	2,016
IN	88.48%	2.02%	4.21%	5.29%	100.00%	1,507
IA	87.48%	3.04%	4.50%	4.98%	100.00%	636
KS	84.19%	3.21%	5.41%	7.19%	100.00%	732
KY	89.58%	1.64%	3.67%	5.11%	100.00%	1,577
LA	81.09%	3.56%	7.02%	8.33%	100.00%	1,454
ME	84.30%	2.02%	4.70%	8.98%	100.00%	321
MD	87.07%	3.25%	4.05%	5.63%	100.00%	1,028
MA	79.02%	3.65%	7.85%	9.48%	100.00%	687
MI	87.22%	2.44%	4.11%	6.23%	100.00%	2,022
MN	85.67%	3.42%	4.57%	6.34%	100.00%	834
MS	78.12%	3.18%	9.32%	9.38%	100.00%	1,408
MO	81.42%	3.46%	5.44%	9.68%	100.00%	1,817
MT	69.64%	2.06%	10.53%	17.77%	100.00%	360
NE	84.36%	3.86%	4.77%	7.01%	100.00%	440
NV	82.21%	2.52%	5.94%	9.33%	100.00%	620
NH	83.81%	1.31%	5.35%	9.53%	100.00%	260
NJ	84.21%	3.08%	6.10%	6.61%	100.00%	1,215
NM	82.68%	2.55%	4.57%	10.20%	100.00%	635
NY	83.69%	2.96%	6.00%	7.35%	100.00%	2,080
NC	87.74%	1.95%	4.27%	6.04%	100.00%	2,846
ND	72.64%	2.22%	8.91%	16.23%	100.00%	193

States	BAC=0	BAC=.01-.07	BAC=.08-.15	BAC=.16+ / refused	Total %	Total # of females in fatal crashes
OH	84.28%	3.07%	4.21%	8.44%	100.00%	2,274
OK	85.32%	1.88%	5.02%	7.78%	100.00%	1,266
OR	82.60%	4.54%	4.94%	7.92%	100.00%	718
PA	84.49%	2.15%	4.24%	9.12%	100.00%	2,561
RI	80.42%	4.24%	6.69%	8.65%	100.00%	118
SC	77.00%	3.67%	7.48%	11.85%	100.00%	1,693
SD	77.33%	2.86%	5.24%	14.57%	100.00%	206
TN	84.58%	2.27%	5.31%	7.84%	100.00%	2,101
TX	78.73%	3.39%	7.67%	10.21%	100.00%	5,578
UT	89.69%	1.78%	3.84%	4.69%	100.00%	445
VT	81.22%	2.68%	6.99%	9.11%	100.00%	123
VA	82.67%	3.34%	5.63%	8.36%	100.00%	1,425
WA	80.59%	2.70%	6.21%	10.50%	100.00%	852
WV	85.52%	1.89%	5.91%	6.68%	100.00%	587
WI	78.14%	3.86%	6.13%	11.87%	100.00%	1,180
WY	79.95%	3.80%	5.43%	10.82%	100.00%	221

### 5.2.2.1 Ohio (Midwest)

This section describes results of the FARS analyses regarding the crash characteristics of alcohol positive female drivers in fatal crashes in Ohio compared to sober female drivers. With regards to differences over this five year period in Ohio, the percentage of alcohol positive female drivers was approximately 18% in 2005, 17% in 2006, and 14% in 2007, 2008 and 2009. For 2005 through to 2009, out of all alcohol positive drivers in Ohio 17% were female and 83% were male. Note that of all fatal crashes occurring in Ohio between 2005 through to 2009, 64% occurred in a rural area.

More alcohol positive female drivers were involved in single vehicle collisions (58%) than sober female drivers in Ohio (25%) and were less often involved in angle impact collisions (19% vs. 39%). Fatal crashes involving alcohol positive female drivers in Ohio less commonly occurred on rural roads (52% vs. 64%) and more commonly occurred on urban roads (48% vs. 36%). Alcohol positive female drivers involved in fatal crashes in Ohio were more often aged 21-34 (37% vs. 25%) and were less often aged 55 or older (8% vs. 28%). They were less often wearing a seat belt at the time of the fatal crash (39%) compared to sober female drivers (75%). A slightly higher

percentage of alcohol positive female drivers were considered by police to have been using drugs at the time of the fatal collision (4%) than was the case for sober female drivers (1%). In terms of specific drug test results, alcohol positive female drivers in Ohio more often tested positive for stimulants (7% vs. 2%), cannabinal (13% vs. 6%), and other drugs (14% vs. 9%) compared to sober female drivers. With regards to speeding at the time of the fatal crash, more alcohol positive female drivers were considered by police to have been speeding (i.e., exceeding the speed limit, racing, or going too fast for conditions) at the time of the fatal crash than sober female drivers (22% vs. 6%).

Not having a valid driver's license at the time of the fatal collision was four times more common among alcohol positive female drivers (21% vs. 5%), and there was little difference in terms of whether there were passengers in the vehicle at the time of the fatal crash (59% vs. 61%). In terms of driver history within the last three years of the fatal crash, 27% of alcohol positive female drivers in Ohio had one or more previous collisions compared to 20% for sober female drivers. Alcohol positive female drivers more commonly had a previous DWI conviction (9%) compared to sober female drivers (1%). Previous speeding convictions were also more common among alcohol positive female drivers (25% vs. 21%), as were other previous convictions within the last three years of the fatal crash (37% vs. 20%). Previous license suspensions (31% vs. 10%) were also more common. Fatal crashes among alcohol positive female drivers in Ohio were more common on Saturdays and Sundays (39%) compared to sober female drivers (26%), and were more common at night between 9:00pm-5:59am (61% vs. 15%), particularly in the 12:00am-2:59am time period (31% vs. 3%). Other variables that were examined, but where no difference was found, included drowsiness as a contributing factor in the fatal crash and time of year.

### 5.2.2.2 New Jersey (Northeast)

This section describes results of the FARS analyses regarding the crash characteristics of alcohol positive female drivers in New Jersey compared to sober female drivers. With regards to differences over this five year period in New Jersey, the percentage of alcohol positive female drivers in New Jersey was approximately 13% in 2005, 20% in 2006, 17% in 2007, 15% in 2008 and 14% in 2009. For 2005 through to 2009, out of all alcohol positive drivers involved in a fatal crash in New Jersey 18% were female and 82%

were male. Note that of all fatal crashes occurring in New Jersey between 2005 through to 2009, 85% occurred in an urban area.

More alcohol positive female drivers in New Jersey were involved in single vehicle collisions (55%) than sober female drivers (32%) and were less often involved in angle impact collisions (16% vs. 32%). Fatal crashes involving alcohol positive female drivers more commonly occurred on rural roads (17% vs. 12%) and less commonly occurred on urban roads (83% vs. 88%). Alcohol positive female drivers involved in fatal crashes in New Jersey were more often aged 21-34 (45% vs. 26%) and were less often aged 55 or older (13% vs. 31%). Alcohol positive female drivers were less often wearing a seat belt at the time of the fatal crash (61%) than sober female drivers (86%).

A higher percentage of alcohol positive female drivers were considered by police to have been using drugs at the time of the fatal collision (62%) than was the case for sober female drivers (24%). In terms of specific drug test results, alcohol positive female drivers slightly more often tested positive for stimulants (3% vs. 1%), more often tested positive for cannabinal (6% vs. 1%), and slightly more often tested positive for other drugs (6% vs. 3%). With regards to speeding at the time of the fatal crash, somewhat more alcohol positive female drivers were considered by police to have been speeding at the time of the fatal crash than sober female drivers (6% vs. 2%). Not having a valid driver's license at the time of the fatal collision was also more common among alcohol positive female drivers (9% vs. 3%) and alcohol positive female drivers less often had passengers in the vehicle at the time of the fatal crash (33% vs. 38%). As for driver history within the last three years of the fatal crash, 24% of alcohol positive female drivers in New Jersey had one or more previous collisions compared to 20% for sober female drivers. For previous DWI convictions, there was little difference between alcohol positive female drivers and sober female drivers (3% vs. 1%), as was the case for previous speeding convictions (10% vs. 8%). Other previous convictions within the last three years of the fatal crash were more common for alcohol positive female drivers (30% vs. 21%), as were previous license suspensions (19% vs. 7%).

Fatal crashes among alcohol positive female drivers in New Jersey were more common on Saturdays and Sundays (43%) compared to sober female drivers (26%), and were more common at night between 9:00pm-5:59am (56% vs. 19%). With regards to the time of year in which the fatal crash occurred,

alcohol positive female drivers were more often in crashes during the months of October through to December (32% vs. 24%), and less often during the months April through to June (21% vs. 25%). Drowsiness as a contributing factor was also examined, but no difference was found.

### 5.2.2.3 Texas (West/South)

This section describes results of the FARS analyses regarding the crash characteristics of alcohol positive female drivers in Texas compared to sober female drivers. With regards to differences over this five year period in Texas, the percentage of alcohol positive female drivers was approximately 21% in 2005, 24% in 2006, 20% in 2007, 19% in 2008 and 22% in 2009. For 2005 through to 2009, out of all alcohol positive drivers in Texas 17% were female and 83% were male. Note that of all fatal crashes occurring in Texas between 2005 through to 2009, 52% occurred in a rural area.

Results of the FARS analyses revealed that alcohol positive female drivers were more often involved in single vehicle collisions (52%) than sober female drivers in Texas (27%) and were less often involved in angle impact collisions (23% vs. 39%). There was little difference between alcohol positive female drivers and sober female drivers in Texas in terms of whether the fatal crash occurred on rural roads (54% vs. 55%) or on urban roads (46% vs. 45%). Alcohol positive female drivers involved in fatal crashes in Texas were more often aged 21-34 (41% vs. 29%) and were less often aged 55 or older (10% vs. 23%). Alcohol positive female drivers were less often wearing a seat belt at the time of the fatal crash (61%) than sober female drivers (86%). More alcohol positive female drivers were considered by police to have been using drugs at the time of the fatal collision (52%) compared to sober female drivers (13%). In terms of specific drug test results, alcohol positive female drivers more often tested positive for stimulants (4% vs. 1%), and more often tested positive for cannabinol (9% vs. 4%), and there was a slight difference in terms of tests for other drugs (6% vs. 4%).

With regards to speeding at the time of the fatal crash, the analyses showed that more alcohol positive female drivers were considered by police to have been speeding (25% vs. 11%). Not having a valid driver's license at the time of the fatal collision was twice as common among alcohol positive female drivers (21% vs. 10%). Fewer alcohol positive female drivers had passengers in their vehicle at the time of the fatal crash (40% vs. 45%). As for driver history within the last three years of the fatal crash, 11% of alcohol positive

female drivers in Texas had one or more previous collisions compared to 8% for sober female drivers. For previous DWI convictions there was little difference between alcohol positive female drivers and sober female drivers (2% vs. 0.4%). Previous speeding convictions were somewhat more common among alcohol positive female drivers (16% vs. 12%).

For other previous convictions, there was little difference between alcohol positive female drivers and sober female drivers (6% vs. 5%). Finally, previous license suspensions within the last three years of the fatal crash were more common among alcohol positive female drivers than among sober female drivers (31% vs. 10%). Fatal crashes among alcohol positive female drivers in Texas were more common on Saturdays and Sundays (45%) compared to sober female drivers (29%) and were more common at night (58% vs. 21%). Other variables that were examined but where no difference was found included drowsiness as a contributing factor in the fatal crash and time of year.

#### 5.2.2.4 Florida (South)

This section describes results of the FARS analyses regarding the crash characteristics of alcohol positive female drivers in Florida compared to sober female drivers. With regards to differences over this five year period in Florida, the percentage of alcohol positive female drivers was approximately 16% in 2005 and 2006, and 14% in 2007, 15% in 2008 and 17% in 2009. For 2005 through to 2009, out of all alcohol positive drivers in Florida 18% were female and 82% were male. Note that of all fatal crashes occurring in Florida between 2005 through to 2009, 61% occurred in an urban area.

Alcohol positive female drivers were more often involved in single vehicle collisions (57%) than sober female drivers in Florida (28%) and were less often involved in angle impact collisions (20% vs. 38%). Fatal crashes involving alcohol positive female drivers in Florida more commonly occurred on rural roads (41% vs. 36%) and less commonly occurred on urban roads (58% vs. 64%). Alcohol positive female drivers involved in fatal crashes were more often aged 21-34 (42% vs. 28%) and were less often aged 55 or older (11% vs. 28%). Alcohol positive female drivers were less often wearing a seat belt at the time of the fatal crash (48% vs. 81%). A higher percentage of alcohol positive female drivers were considered by police to have been using drugs at the time of the fatal collision (39%) than was the case for sober female drivers (11%). In terms of specific drug test results, alcohol positive

female drivers in Florida more often tested positive for stimulants (7% vs. 2%), there was little difference in positive tests for cannabinol (3% vs. 1%), and they more often tested positive for other drugs (9% vs. 4%).

With regards to speeding at the time of the fatal crash, more alcohol positive female drivers were considered by police to have been speeding at the time of the fatal crash than sober female drivers (17% vs. 4%). Not having a valid driver's license at the time of the fatal collision was two times more common among alcohol positive female drivers (15%) compared to sober female drivers (7%). There was little difference in terms of whether there were passengers in the vehicle at the time of the fatal crash (38% vs. 40%). As for driver history within the last three years of the fatal crash, there was little difference between alcohol positive female drivers compared to sober female drivers in terms of previous collisions (7% vs. 5%). Similar results were found for previous DWI convictions in Florida (2% vs. 0.45%). Previous speeding convictions within the last three years of the fatal crash were more common among alcohol positive female drivers (29% vs. 19%).

Other previous convictions within the last three years of the fatal crash were also more common for alcohol positive female drivers (22% vs. 14%), as were previous license suspensions (18% vs. 9%). Fatal crashes among alcohol positive female drivers in Florida were more common on Saturdays and Sundays (43%) compared to sober female drivers and were more common at night (30% vs. 21%). Other variables that were examined but where no difference was found included drowsiness as a contributing factor in the fatal crash and time of year.

## 5.3 Summary

### 5.3.1 National results

Analyses of the FARS data revealed that the crash characteristics of alcohol positive female drivers (BAC of at least .01) and drunk female drivers (BAC of at least .08) were different from those of sober female drivers involved in fatal crashes. As evidence of this, regardless of BAC level, alcohol positive female drivers were more commonly involved in single vehicle crashes and less often in angle impact crashes. They were more often aged 21 to 34 and less often aged 55 or older. Alcohol positive and drunk female drivers less often wore seat belts and were more often suspected of using drugs at the time of the fatal crash. And, when tested for drugs, alcohol positive and

drunk females were more likely to have a positive test result. Alcohol positive and drunk female drivers were more often considered by police to have been speeding and to have an invalid license at the time of the fatal crash. In regard to the driver record of alcohol positive and drunk female drivers in fatal crashes, they were more likely to have had a previous collision, previous DWI conviction, previous speeding conviction, or other previous convictions. Alcohol positive and drunk female drivers were also more likely to have a previous license suspension. Finally, fatal collisions involving alcohol positive and drunk female drivers were more common on Saturdays and Sundays and at night. Note that similar patterns were also found for alcohol positive and drunk male drivers compared to sober male drivers, suggesting that many crash characteristics of alcohol positive and drunk male and female drivers appear similar (see Table 4). In general, the profile of males resembles that of females. However, alcohol positive and drunk male drivers were more often considered by police to be using drugs, to be speeding, to not be properly licensed at the time of the fatal crash, and more often had previous other convictions and previous license suspensions.

### **5.3.2 Different levels of BAC among alcohol positive female drivers in fatal crashes**

With regards to the FARS analyses of the crash characteristics of alcohol positive drivers for different levels of BAC (.01-.07; .08-.15; .16+), as BAC increases, the more likely it is the fatal crash was a single vehicle crash. The pattern for males is comparable, although more pronounced. In terms of the manner of collision, the higher the BAC of the driver in a fatal crash whether male or female, the less likely it is the fatal crash was an angle impact crash. There was little difference across levels of BAC in terms of whether the fatal crash occurred in a rural or urban area and this was true for both males and females. As BAC levels rise from below .08 to above .08, the more likely it is for the driver to be between the age of 21 and 34. The same pattern was noted for males. Regardless of gender the higher the BAC of driver in a fatal crash, the more likely it is that they were not wearing a seat belt and the more likely it is that the driver was considered by police to have been using drugs. In terms of specific drug test results at the time of the fatal crash, there was little difference across levels of BAC, or between males and females. With regards to speeding, the higher the BAC of the driver in the fatal crash, the more likely it is the driver was considered by police to have been speeding

and the more likely it is that the driver did not have a valid driver's license at the time of the fatal crash. The same pattern was noted for males, but the percentages were higher. In terms of whether passengers were present at the time of the fatal crash, as BAC levels of drivers increase, it is somewhat less likely that drivers had passengers in the vehicle. The percentages for males were lower with a different pattern. As for driver history, there was little to no difference between different levels of BAC in terms of previous collisions. With regards to females who had been previously convicted of DWI on one or more occasions, as BAC levels of female drivers increase to higher levels, the more likely it is that drivers had a previous DWI conviction. The pattern for males was somewhat similar with a more gradual increase. In terms of previous speeding convictions, there was little difference across levels of BAC for both female and male drivers. The same was true for previous other convictions. As BAC levels increase among drivers in fatal crashes, it is somewhat more likely that drivers had a previous license suspension within the last three years prior to the fatal collision. A comparable pattern was noted for males, but percentages were higher. Fatal collisions occurring on Saturdays and Sundays were just as common across levels of BAC and were similar to those of males. Finally, as levels of BAC among drivers increase, the more likely it is that the fatal collision occurred at night (9:00pm-5:59am). The pattern for males is comparable although more pronounced.

### 5.3.3 State results

The results pertaining to the crash characteristics of alcohol positive female drivers in general were examined from one state for each of the U.S. Census Bureau divisions: Midwest – Ohio (OH), Northeast – New Jersey (NJ), West/South – Texas (TX) and South – Florida (FL). Compared to the national percentage of alcohol positive female drivers (16%) in relation to males (84%), OH (17%), TX (17%), NJ (18%) and FL (18%) had a similar percentage of alcohol positive female drivers. When comparing alcohol positive female drivers to female sober drivers from 2005 to 2009, nationally, the trend remained stable after dropping from 18% in 2005 to around 16% from 2006 through to 2009. The trend in FL was also relatively stable, staying at 16%. As for OH, there was a decreasing trend from 18% in 2005 to 14% from 2007 to 2009. In NJ, the percentage increased from 13% in 2005 to 20% in 2006, then decreased to 14% in 2009. Finally, in TX, the percentage

also increased from 2005 to 2006 from 21% to 24%, then decreased to 22% in 2009.

In terms of crash characteristics, the profile of each state is largely consistent with the national profile. There was however some variation. One distinct variation across the states is whether the fatal crashes involving alcohol positive female drivers occurred in a rural or urban area. Fatal crashes involving alcohol positive female drivers more often occurred on urban roads in OH which is for the most part a rural area. Conversely, in NJ and FL, alcohol positive female drivers were more often in fatal crashes on rural roads which are both largely urban areas. There was little difference for TX, which is consistent with the national results. It should be noted, however that about half (54%) of TX roads are urban.

Whether alcohol positive female drivers were considered by police to be using drugs also differed across the states. Particularly, in OH, the percentage of alcohol positive female drivers considered to be using drugs was very low (4%) compared to NJ (62%), TX (52%) and FL (39%), and is also low compared to the national percentage (48%). Speeding and not having a valid license were less common in NJ among alcohol positive female drivers (6% and 9% respectively) compared to OH (22% and 21%), TX (25% and 21%) and FL (17% and 15%). Nationally, these percentages were 25% and 17%. Alcohol positive female drivers in FL (29%) more often had previous speeding convictions which was consistent with the national results (21%), but there was little difference in the other states analyzed (less than 5%).

With the exception of TX where little difference was found, all other states were consistent with the national results which showed that alcohol positive female drivers more often had previous other convictions. Finally, only one state (NJ) showed a difference between alcohol positive female drivers and sober female drivers with regards to the time of year in which the fatal crash occurred, more often occurring during the months of October through to December and somewhat less often occurring in April through to June. No difference was found for time of year nationally, or for the other states.



## 6. EFFECTIVE PROGRAMS AND PRACTICES

Little is known about the effectiveness of programs and interventions for women convicted of drunk driving offenses. The majority of research studies evaluating the effectiveness of programs for DWI offenders do not differentiate the effects of the program by gender. However, despite the lack of research on program effectiveness among females, there is some evidence of differences between women and men's substance-related offending, their respective needs, and treatment outcomes (McMurran et al. 2011) that can inform the development of interventions targeted towards this population.

### 6.1 Female offender needs

Female DWI offenders possess somewhat different characteristics than males, as discussed previously in Section 4, which suggest their needs are slightly different. To summarize, a 2011 systematic review of the literature regarding gender differences in offenses involving alcohol among offenders found that female drunk drivers are generally older than men; have higher levels of education but lower paying jobs. Women are more likely to be separated, divorced, or widowed. In contrast, men are more likely to be married or single (McMurran et al. 2011). Additionally Maxwell and Freeman (2007) found that at 60-day follow-up from treatment women were more likely to be living with someone who had a substance abuse problem and this was one of the strongest predictors of not being abstinent at follow-up (Maxwell and Freeman 2007). Many female drunk drivers also have mental health problems (McMurran et al. 2011). This review further indicates that there

may also be specific sub-groups of female drunk drivers that would likely benefit from more specialized treatment such as older women with mental health issues (McMurrin et al. 2011).

Women are also different from men in regard to the development of substance use and related problems. Of some importance, females tend to develop substance abuse problems when they are older and they also tend to develop them faster than men (Green 2006).

A review of the literature regarding substance abuse treatment for women generally found that over their lifetime, women with substance use disorders are less likely to enter treatment compared to males (Greenfield et al. 2007). Since many substance abuse treatment programs can be entered voluntarily, this difference may be related to gender differences in likelihood to seek help. Research has also noted that females tend to seek help in mental health settings rather than in specialized programs (Green 2006). Green et al. (2002) found that women with alcohol-related diagnoses were more likely to initiate substance abuse treatment, but that when women had other mental health diagnoses, they were less likely to initiate treatment.

It has also been suggested that women may experience different barriers in relation to initiating and completing treatment for a substance abuse disorder as compared to men (Green 2006). White and Hennessey's monograph of information from the scientific literature, in conjunction with their experiences in treating female DWI offenders, reveals several barriers to treatment for women. One obstacle is the social stigma of addicted women, particularly addicted mothers. Many women are also fearful of the consequences of entering treatment, such as the loss of custody of their children or other legal punishments. Another obstacle is the lack of social support from family, friends and intimate partners, especially for those with an addicted partner. Finally, many women are also financially disadvantaged which can affect their accessibility to transportation and child care (White and Hennessey 2006).

There is also evidence that there are differences in the characteristics of male and female clients in general substance abuse treatment programs. A multi-site longitudinal study in the U.S. from 1992 to 1997 found that more women were living with a child under the age of 18 (60%) compared to men (18%); more women had experienced physical abuse (44% vs. 8% for men); and women had a higher average number of previous psychiatric hospitalizations (3.5) compared to men (2.9) (Marsh et al. 2004).

As discussed in Section 4 of this report, many offenders who abuse substances also have histories of trauma, physical and sexual abuse, and co-occurring mental disorders (e.g., anxiety, post-traumatic stress disorder, schizophrenia, bipolar disorder, depression) or drug-use disorders that can make treatment more complex (SAMHSA 2005). Studies of DWI offenders have found that these offenders are more likely than the general population to have co-occurring substance use disorders and other mental disorders including post-traumatic stress disorder (Shaffer et al. 2007). Compared to males, female DWI offenders with alcohol use disorders have been shown to be more likely to have major depressive disorders and post-traumatic stress disorders (Lapham et al. 2001). Female DWI offenders in treatment have also been shown to be more likely than males to be diagnosed with drug dependence and depressive or bipolar disorders and to be placed on medication for depression or anxiety when admitted to treatment (Maxwell and Freeman 2007).

A Texas study of DWI offenders in substance abuse treatment between 2000 and 2005 revealed that female DWI offenders compared to males were not as likely to report a primary problem with alcohol (63.7% vs. 73.3%) and were more likely to report using a combination of substances (53.1% vs. 46.8%). Females were more likely than males to have a depressive disorder (16% vs. 7%) or bipolar disorder (12% vs. 5%). In terms of family characteristics, female offenders were more likely to have children under 19 years of age living with them (46.9%) compared to males (32.1%) and more females were seeking custody to regain their children (11%) compared to males (1.5%) (Maxwell and Freeman 2007).

With regards to treatment completion, fewer women in the Texas study successfully completed treatment (67.1%) than was the case for males (71.7%). Offenders were also contacted at 90-day follow-up after treatment and follow-up contact could only be made with less than half of the sample. Of those who were contacted, females were less likely to be employed with 36.6% of females working full-time compared to 61.2% for males, and 22.3% of females were unemployed and not seeking work compared to 8.7% for males (Maxwell and Freeman 2007). It was also found that at 60-day follow-up from treatment women were more likely to be living with someone who had a substance abuse problem and this was one of

the strongest predictors of not being abstinent at follow-up (Maxwell and Freeman 2007).

A more recent study by Freeman et al. (2011) of DWI offenders in substance abuse treatment between 2005 and 2008 in Texas found that alcohol was the primary problem for both male and female DWI offenders. However, females were more likely than males to have problems with methamphetamines, cocaine, and opiates.

The finding in the Texas studies that more female DWI offenders entered treatment with a problem with drugs suggests that drunk driving can include both alcohol and drugs. Thus treatment for dependence for DWI offenders addressing a range of substances, not just alcohol may be of benefit (Freeman et al. 2011; Maxwell and Freeman 2007).

Collectively, these data provide insight into ways in which the experiences of females and males are different in relation to substance abuse treatment. More research is needed into the experiences of males and females in relation to other types of drunk driving sanctions and programs (e.g., DWI courts, alcohol monitoring technologies, community supervision, sober housing) to determine if these differences are consistent across various types of sanctions. This research may have important implications for the delivery of such sanctions and their level of effectiveness among female DWI offenders.

## 6.2 Sanctions and penalties

There is a wealth of research examining the effectiveness of a wide variety of sanctions specifically for both first and repeat DWI offenders. Of interest, effective sanctions include license suspension and revocation, electronic monitoring or home alcohol monitoring, fines, vehicle impoundment or immobilization, alcohol ignition interlocks, license plate impoundment, intensive supervision probation, DWI courts and treatment as appropriate (Simpson et al. 1996; NHTSA 2005). It is important to note that specific features associated the use of these sanctions can have important effects on effectiveness. While long-term incarceration has no significant effects and may even be harmful, there is some evidence to support the use of short-term jail sentences. In this regard, it appears that the certainty and swiftness of the sanction is more important than the severity (Simpson et al. 1996). For a complete review of recent research on the effectiveness of these sanctions

please refer to “A Guide to Sentencing DWI Offenders, 2<sup>nd</sup> Edition” that was produced by NHTSA in 2005.

As noted previously, there are few research studies that have specifically examined the effectiveness of post-conviction sanctions in relation to gender. Although there is some data to suggest the extent to which females participate in a variety of sanctions. As reviewed in Section 3, there were 79,000 female DWI offenders on probation in 1997 as well as 2,900 females in jail and 1,000 females in state prison.

An inventory of interlock programs currently in operation in Australia, Canada, Europe and the U.S. is available at <http://iip.tirf.ca/inventory/index.php>. Ignition interlock programs are operational in almost all jurisdictions in the U.S. Unfortunately information about program participants does not often distinguish between genders, and few programs have been evaluated. There are however, a few jurisdictions in the U.S. that have provided the gender breakdown of those participating in such programs. Personal communication with several interlock program managers in 2011 revealed the following:

- Maine’s program consisted of 75.1% males (N=187) and 24.9% females (N=62);
- Oklahoma’s participants were 75.6% (N=5,737) male and 24.4% female (N=1,851);
- Hawaii’s participants were 78.7% male (N=70) and 21.3% female (N=19);
- Oregon’s program in 2009 was 80.7% (N=2,544) vs. 19.3% (N=609) for females; and,
- Since the initiation of Florida’s program which was fully operational as of 2005, there were 36,573 males and 10,953 females in the program (no current numbers are available).

Similarly, data from the largest alcohol monitoring vendor in the United States suggest that almost 20% of offenders who are supervised using continuous alcohol monitoring are female.

A study of three DWI courts in Georgia indicated that 83% of participants were male and 17% female. This study concluded that these courts have the potential to reduce recidivism, but it was not indicated whether such programs were more or less effective with women specifically. It was however indicated that gender did not predict recidivism ( $p=0.90$ ) (Fell et al. 2011).

These data do suggest that there are a significant number of female DWI offenders who are involved in these various sanctions, hence it is important to determine whether these interventions are achieving the intended results with this population.

There has been some research in relation to Victim Impact Panels where offenders hear about the impact that drunk driving has had on those who have been injured by drunk driving collisions or who lost loved ones due to a drunk driver. These panels have been shown to increase the risk of repeat arrest for female repeat offenders, but not for male repeat offenders or for male and female first offenders (C'de Baca et al. 2001). These findings suggest that hearing these panels' stories may increase feelings of guilt and shame among female offenders which may increase their drinking behavior. The authors do however caution that more research to confirm this is needed (McMurran et al. 2011). However, a systematic review of interventions for alcohol-related offending by women found that interventions that increase women's negative emotions may increase their risk of recidivism (McMurran et al. 2011)

## 6.3 Treatment strategies

### 6.3.1 Alcohol abuse

In terms of treatment for substance abusing women in general, gender-specific treatment has been recommended. However, studies that have compared treatments that differ in terms of gender issues have found mixed results (Greenfield et al. 2007).

Once in treatment, there is little difference between males and females in terms of effectiveness and this goes for different measures of effectiveness including program retention, completion, and outcomes. A review of studies examining substance abusing women in treatment found that certain characteristics are associated with better outcomes in terms of treatment retention and completion for both men and women. These characteristics include lower levels of psychiatric symptoms, higher income, being employed, higher levels of education, and social supports, as well as having personal and social stability (Greenfield et al. 2007). However, many of these predictors vary by gender and have been found to be associated with women's retention in substance abuse treatment. For example, the prevalence of co-occurring disorders among females with substance use disorders is higher than that

of males and this has been shown to have a negative impact on treatment retention (Greenfield et al. 2007).

An evaluation of treatment programs for women with co-morbid post-traumatic stress disorder and substance use disorders in a group of low-income urban women compared Seeking Safety, “a short-term, manualized cognitive behavior treatment that simultaneously addresses trauma and substance abuse” and relapse prevention with standard community care. The study found that at the end of treatment, women in Seeking Safety and relapse prevention had significantly greater improvements in terms of substance use and post-traumatic stress severity compared to those in community care. In fact, post-traumatic stress symptoms worsened over time for those in the community care group. At six-month and nine-month follow-ups, improvements were sustained for women in the Seeking Safety and relapse prevention programs (Hien et al. 2004).

A longitudinal multi-site study of drug treatment programs in the U.S. from 1992 to 1997 showed that, compared to men, women enter treatment with more psychosocial problems, they receive more services while in treatment, and have better treatment outcomes as measured in terms of substance use after treatment (Marsh et al. 2004). Post-treatment substance abuse was reduced after receiving mental health services for women, but not for men. However, men were more likely to receive treatment in programs that offered psychiatric services (54%) compared to women (38%) (Marsh et al. 2004). Thus, when women who enter substance treatment also have mental health issues, mental health services should be provided in order for treatment to enhance effectiveness.

Claus et al. (2007) found that women in specialized treatment (i.e., women-only programs) had longer mean length of stay (treatment retention) compared to mixed-gender programs, but there was no difference in terms of treatment completion. This study also found that women in specialized treatment more often received continued care, or aftercare treatment (37%) than did women in standard programs (14%). Specialized treatment agencies were found to provide women with significantly more referrals to treatment which may facilitate the continuity of care. The authors note the importance of this, as there is evidence that improvements in substance abuse, employment, and criminal justice contacts have been associated with continuity of care for both men and women (Claus et al. 2007).

Using relapse as a measure of alcohol treatment outcomes, Walitzer and Dearing's (2006) review of the literature of gender differences in relapse to alcohol and substance use found that women tend to enter treatment with a larger set of problems. Despite this, women have the same rate of relapse as men and more effectively recover from relapse. Women, compared to men, are more likely to be married to a heavy drinker. Further, risk of relapse was more likely for women when they were with a romantic partner or friend compared to men who are more likely to relapse alone. Thus, women with substance abuse problems are at an increased risk for relapse due to marital issues, but for men marriage serves as a protective factor as they are at heightened risk for relapse when alone (Walitzer and Dearing 2006).

With regards to prison-based outcomes in general, a randomized study of substance abuse treatment for women in prison by Messina et al. (2010) compared the outcomes of a standard prison program to a gender-responsive treatment program (GRT). Standard treatment within California primarily focuses on positive attitudes and remaining drug free and typically does address gender issues or histories of trauma. In comparison, the GRT program places more emphasis on relational aspects of women's addiction and recovery (i.e., the role of relationships and intimate partners) and addresses issues of trauma. The GRT program also consisted of all female treatment staff whereas standard treatment staff consisted of both men and women.

Multivariate analyses controlling for factors such as race/ethnicity and marital status showed that females in the GRT had significantly more success after being paroled. Specifically, those who participated in GRT had significantly larger reductions in drug use, stayed in aftercare treatment for longer, and were less likely to be incarcerated within one year of parole compared to those in standard treatment. In a subsequent study by Cohen and Hien (2006), the Seeking Safety group and relapse prevention group were collapsed into one group as no differences were found between these two treatment groups in order to further examine treatment effects. This study showed that although substance use and post-traumatic stress symptoms significantly decreased for the treatment group compared to the control group at three-month follow-up, no significant differences were found for symptoms of depression, dissociation and social and sexual functioning. Such results speak to the

unique and varied treatment needs of women with substance use disorders (Cohen and Hien 2006).

A recent study examining the impact of an alcohol treatment program for patients with co-morbid disorders found that at two-year follow-up, females had higher rates of overall abstinence (53.6%) compared to males (29.3%). When examining these results by psychiatric diagnosis, depressed female alcohol abusers had significantly higher abstinence levels (57.4%) than depressed males (25.5%), but no significant difference was found for bipolar clients (Farren et al. 2011).

### **6.3.2 Features of effective programs**

There are many obstacles that women face when it comes to gaining access to treatment including lack of transportation and childcare. Access to substance abuse treatment could be enhanced by providing childcare and family services to women, including transportation (Greenfield et al. 2007). On-site child care services can make it easier for mothers to attend treatment by making child care readily available. Still, research on the subject of treatment outcomes regarding child care is lacking (Sun 2006).

In terms of the perceptions of women with substance use disorders, it has been found that single-gender treatment (i.e., women only) may be perceived more positively than mixed-gender treatment (Greenfield et al. 2007). Unfortunately, there are few women-only programs available. To illustrate, a national survey of substance abuse treatment facilities showed that the number of women-specific facilities increased between 1992 and 1998. Such facilities tended to provide services that are more comprehensive and address treatment needs that have been shown to improve outcomes among women (Grella and Greenwell 2004). However, such women-specific programs make up only a small minority of the treatment programs available. The majority of treatment facilities are outpatient facilities (80%) and most women-only programs are delivered in residential facilities. Further, specialized treatment is least often provided among alcohol treatment facilities. Among drug treatment programs for women only, less than half provided services for pregnant or postpartum women, prenatal or perinatal care, child care, and women or domestic services. Thus, most women receive treatment in non-specialized, mixed-gender programs which do not address women's treatment needs (Grella and Greenwell 2004). Women-only programs should be made available when possible, and when not, the option of women-only groups

should be offered. It is still unknown however, which aspects of women-only programs actually affect positive outcomes (Sun 2006).

Gender differences in responsiveness to treatment reinforce “the need to develop gender-specific treatment protocols to optimize treatment effectiveness” (Marsh et al. 2004, p.299). However, there is much evidence which suggests that treatment outcomes do not vary by gender alone, but that interactions between other characteristics and outcomes do vary by gender. For example, young female drivers who drive after drinking have different characteristics than their older counterparts (Tsai et al. 2010). Thus, programs which address the needs of different sub-groups of offenders may be more beneficial than gender-specific programs alone.

In terms of treating substance abuse and mental health problems, sometimes mental health treatment and substance abuse treatment have competing goals because they each have different ways of treating problems. Many times, people with mental health problems can benefit from the use of medications; however, some substance abuse programs may try to help the client stop all drug use including medications. Other times, addiction services may use a harm reduction approach, encouraging clients to reduce their substance abuse. On the other hand, mental health services may encourage the client to completely stop using alcohol or other drugs before treatment. To ensure the proper care of the individual seeking help, treatment needs to be customized to the client, addressing each person’s particular needs (Skinner et al. 2004). Further, in order to properly customize treatment to the client, effective and convenient screening mechanisms are needed (Freeman et al. 2011) to determine the prevalence of co-occurring disorders among females with substance use disorders which has been shown to be higher than that of males (Greenfield et al. 2007).

Sun’s (2006) systematic review of the literature regarding women’s substance abuse treatment effectiveness in general provided suggestions for potentially effective programming. With respect to treatment setting, for women with limited resources and more severe problems, residential treatment (as opposed to outpatient care) has a more positive impact. Although it should be noted that what remains to be known is which specific features of these programs may have affected outcomes. Specifically, most studies focused on treatment retention. Thus, more research is needed regarding treatment

outcomes including substance use, criminal behavior, and employment (Sun 2006).

With regards to type of treatment, case-management was positively associated with treatment retention and enhanced treatment outcomes. However, the studies reviewed had many design weaknesses and could not account for differences between treatment interventions, such as those that provide multiple treatment conditions for different issues (Sun 2006). Individual counseling has been shown to be related to better treatment outcomes for women, specifically when counselors were supportive, non-confrontational, and non-judgmental. Such an approach may address women's feelings of shame and guilt more effectively than group counseling. Unfortunately, a study of drug treatment programs in the U.S. from 1992 to 1997 found that more programs that served men offered individual counseling once or more per week (89%) compared to programs that served women (80%) (Marsh et al. 2004). Even though group treatment is the norm, individual counseling should be additionally offered when possible. More research however, is needed to investigate whether supportive group sessions can also have positive effects on treatment outcomes for women (Sun 2006).

### 6.3.3 Recommendations

White and Hennessey's (2006) monograph includes information from the scientific literature and their experiences in treating female DWI offenders and recommends the following to enhance the "quality of the evaluation, education, treatment and supervision of female DWI offenders in the State of Illinois" (p.16). These recommendations are also applicable more generally.

- Develop gender-specific evaluation instruments and training for evaluators.
- Develop a research-based gender-specific recidivist risk profile.
- Develop gender-specific programs, education materials and DWI treatment models.
- Develop gender-specific DWI treatment services and encourage referrals to assure enough numbers to form women's groups.
- Develop a directory of women's recovery support groups and establish liaison committees between the courts, treatment and community.
- Recruit recovered women to volunteer and serve as recovery coaches.

- > Conduct a survey to get feedback related to the services they have received.
- > Analyze all data for gender differences.

White and Hennessey also provide the following tips to enhance recovery among women:

- > Establish a safe environment with a kind and respectful approach.
- > Make expectations clear and provide positive feedback and support.
- > Convey hope and acknowledge efforts.
- > Individualize treatment through knowing what values, beliefs and motivators are driving her.

*“A key to ongoing recovery is the ability to explore what doesn’t work and try new strategies.”* (White and Hennessey 2006, p.14).

Although there has been more research focusing on the effectiveness of substance abuse treatment for women in general, there is very little research concerning the effects that such treatment has in terms of women’s drinking and driving behavior.

## 6.4 Summary

There is some evidence of differences between women and men’s substance-related offending, their respective needs, and treatment outcomes (McMurrin et al. 2011). For example, women may experience different barriers in relation to initiating and completing treatment for a substance abuse disorder as compared to men (Green 2006).

There are some data to suggest that an estimated 15-25% of DWI offenders involved in various sanctions such as interlock programs and DWI courts are female. However, there are few research studies that have specifically examined the effectiveness of sanctions in relation to gender. Some research suggests that interventions that increase women’s negative emotions may increase their risk of recidivism (McMurrin et al. 2011).

Women with substance use disorders have unique and varied treatment needs (Cohen and Hien 2006). Women tend to enter alcohol treatment with a larger set of problems (Walitzer and Dearing 2006). Despite this, women have the same rate of relapse as men and more effectively recover from relapse (Walitzer and Dearing 2006). Many women who enter substance

treatment also have mental health issues. The prevalence of co-occurring disorders among females with substance use disorders is higher than that of males and this has been shown to have a negative impact on the response to treatment (Greenfield et al. 2007). Thus, mental health services should be provided as needed in order for treatment to be effective (Marsh et al. 2004). Further, improvements in substance abuse, employment, and criminal justice contacts have been associated with continuity of care for both men and women (Claus et al. 2007).

Once in treatment, there is little difference between males and females in terms of effectiveness and this applies to different measures of effectiveness including program retention, completion, and outcomes (Greenfield et al. 2007).

With regards to features of effective programs, on-site child care services can make it easier for mothers to attend treatment by making child care readily available (Sun 2006). It has been found that single-gender treatment (i.e., women only) may be perceived more positively than mixed-gender treatment (Greenfield et al. 2007). Women-only programs should be made available when possible, and when not, the option of women-only groups should be offered (Grella and Greenwell 2004). Individual counseling has also been shown to be related to better treatment outcomes for women, specifically when counselors were supportive, non-confrontational, and non-judgmental (Sun 2006).

Some evidence suggests that treatment outcomes do not vary by gender alone, but that interactions between other characteristics and outcomes do vary by gender (Tsai et al. 2010). Therefore, programs which address the needs of different sub-groups of offenders may be more beneficial than gender-specific programs alone. Further, in order to properly customize treatment to the client, effective and convenient screening mechanisms are needed (Freeman et al. 2011).

More research about what works with female drunk drivers is needed. What still must be determined is what particular components of treatment produce better outcomes and what specific features contribute to change (Sun 2006).

## 7. REFERENCES

- Argeriou, M., McCarty, D., Potter, D., & Holt, L. (1986). Characteristics of men and women arrested for driving under the influence of liquor. *Alcoholism Treatment Quarterly*, 3, 127–137.
- Baker, S.P., Braver, E.R., Chen, L-H., Li, G., & Williams, A.F. (2002). Drinking histories of fatally injured drivers. *Injury Prevention*, 8(3), 221-226.
- Begley, S. (February 28, 2000). Getting inside a teen brain. *Newsweek* 135(9), 58-59.
- Behavioral Health Research Centre of the Southwest (BHRCs). (2007). *Follow-up of Female DWI Offenders Five Years After Screening*. Research Projects. Funded by the National Institute on Alcohol Abuse and Alcoholism. Retrieved from: <http://www.bhrcs.org/research/project05.htm>.
- Beirness, D. & Simpson, H. (1988). Lifestyle correlates of risky driving and accident involvement among youth. *Alcohol, Drugs and Driving*, 4, 193-204.
- Beirness, D. & Simpson, H. (1997). *Study of the Profile of High-Risk Drivers*. Ottawa: Transport Canada, Road Safety and Motor Vehicle Regulation (TP-13108).
- Bergdahl, J. (1999). An application of convergence theory to women's drinking and driving. *Women and Criminal Justice*, 10(4), 93-107.
- Bloom, B., Owen, B., & Covington, S. (2003). *Gender-Responsive Strategies: Research, Practice and Guiding Principles for Women Offenders*. Washington, D.C.: National Institute of Corrections.
- Brady, K. & Randall, C. (1999). Gender differences in substance use disorders. *Psychiatric Clinics of North America*, 22, 241–252.
- Brown, A., Tapert, S., Granholm, E., & Delis, D. (2001). Neurocognitive functioning of adolescents: Effects of protracted alcohol use. *Alcoholism: Clinical and Experimental Research*, 24, 164-171.
- Burgess, M., & Lindsey, T. (1997). *Alcohol Involvement in Fatal Traffic Accidents 1995*. Technical Report DOT HS 808 547. Washington, D.C.: U.S. Department of Transportation.
- Caldwell-Aden, L., Kaczowka, M., & Balis, N. (2009). *Preventing First-Time DWI Offenses. First-Time DWI Offenders in California, New York and Florida: An Analysis of Past Criminality and Associated Criminal Justice Interventions*. DOT HS 811 074. Washington, D.C.: U.S. Department of Transportation.
- C'de Baca, J., Lapham, S., Liang, H., & Skipper, B. (2001). Victim impact panel: Do they impact drunk drivers? A follow-up of female and male, first-time and repeat offenders. *Journal of Studies on Alcohol*, 62, 615-620.
- Cerrelli, E. (1994). *Female Drivers in Fatal Crashes, Recent Trends*. US Department of Transportation. DOT HS 808 106. Washington, D.C.: U.S. Department of Transportation.

- Chalmers, D., Olenick, N.L., & Stein, W. (1993). Dispositional traits as risk in problem drinking. *Journal of Substance Abuse*, 5, 401-410.
- Chang, I., Lapham, S.C., & Barton, K.J. (1996). Drinking environment and socio-demographic factors among DWI offenders. *Journal of Studies on Alcohol*, 57, 659–669.
- Chou, P. S., Grant, B. F., & Dawson, D. A. (2005). Twelve-month prevalence and changes in driving after drinking: United States, 1991–1992 and 2001–2002. *Drug and Alcohol Dependence*, 80, 223-230.
- Claus, R.E., Orwin, R.G., Kissin, W., Krupski, A. Campbell, K., & Stark, K. (2007). Does gender-specific substance abuse treatment for women promote continuity of care? *Journal of Substance Abuse Treatment*, 32, 27-39.
- Cohen, L.R., & Hien, D.A. (2006). Treatment outcomes for women with substance abuse and PTSD who have experienced complex trauma. *Psychiatric Services*, 57(1), 100-106.
- Dawson, D., Grant, B., & Chou, P. (1995). Gender differences in alcohol intake. In: W., Hunt and S. Zakhari (Eds.), *Stress, Gender, and Alcohol-Seeking Behavior*. National Institute on Alcohol Abuse and Alcoholism (NIAAA) Research Monograph No. 29. NIH Pub. No. 95–3893. (pp. 1-21). Bethesda, MD: NIAAA.
- Donovan, D., Umlauf, R. & Salzberg, P. (1988). Derivation of personality subtypes among high-risk drivers. *Alcohol, Drugs & Driving*, 4(3), 233-244.
- Drew, L., Royal, D., Moulton, B., Peterson, A., & Haddix, D. (2010). *National Survey on Drinking and Driving Attitudes and Behaviors: 2008*. Washington, D.C.: U.S. Department of Transportation.
- Elliott, M.R., Shope, J.T., Raghunathan, T.E., & Waller, P.F. (2006). Gender differences among young drivers in the association between high-risk driving and substance use/environmental influences. *Journal of Studies on Alcohol*, 67(2), 252-260.
- Falk, D, Yi, H., & Hiller-Sturmhöfel, S. (2008). An epidemiologic analysis of co-occurring alcohol and drug use disorders: Findings from the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC). *Alcohol Research and Health*, 31(2), 100-110.
- Farren, C.K., Snee, L., & McElroy, S. (2011). Gender differences in outcome at 2 year follow-up of treated bipolar and depressed alcoholics. *Journal of Studies on Alcohol and Drugs*, 72(5), 872-880.
- Farrow, J.A., & Brissing, P. (1990). Risk for DWI: A new look at gender differences and drinking and driving influences, experiences, and attitudes among new adolescent drivers. *Health Education Behavior*, 17(2), 213-221.
- Federal Bureau of Investigation (FBI). (2007). *Uniform Crime Statistics: 2006*.
- Federal Bureau of Investigation (FBI). (2008). *Crimes in the United States, 2007: Table 33*. [http://www2.fbi.gov/ucr/cius2007/data/table\\_33.html](http://www2.fbi.gov/ucr/cius2007/data/table_33.html).

- Federal Bureau of Investigation (2010). *Uniform Crime Reports*. <http://www.fbi.gov/about-us/cjis/ucr/ucr>.
- Fell, J., Tippetts, S., & Langston, E. (2011). *An Evaluation of Three Georgia DUI Courts*. DOT HS 811 450. Washington, D.C.: Department of Transportation. Available online: <http://www.nhtsa.gov/staticfiles/nti/pdf/811450.pdf>.
- Flensburg-Madsen, T., Knop, J., Mortensen, E., Becker, U., & Grønbaek, M. (2007). Amount of alcohol consumption and risk of developing alcoholism in men and women. *Alcohol and Alcoholism*, 42, 442-447.
- Freeman, J., Maxwell, J.C., & Davey, J. (2011). Unraveling the complexity of driving while intoxicated: A study into the prevalence of psychiatric and substance abuse comorbidity. *Accident Analysis and Prevention* 43(1), 34-39.
- Gebers, M. & Peck, R. (2003). Using traffic conviction correlates to identify high accident-risk drivers. *Accident Analysis and Prevention*, 35(6), 903-912.
- Grant, B., & Dawson, D. (1997). Age of onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of Substance Abuse*, 9, 103-110.
- Green, C.A. (2006). Gender and use of substance abuse treatment services. *Alcohol Research & Health*, 29(1), 55-63.
- Green, C.A., Polen, M.R., Dickinson, D.M., Lynch, F.L., & Bennett, M.D. (2002). Gender difference in predictors of initiation, retention, and completion in HMO-based substance abuse treatment programs. *Journal of Addictive Diseases*, 23, 47-70.
- Greenfield, S.F. (2002). Perspectives: Women and alcohol use disorders. *Harvard Review Psychiatry*, 10(2), 76-85.
- Greenfield, S., Brooks, A.J., Gordon, S.M., Green, C., Kropp, F., McHugh, K., Lincoln, M., Hien, D., & Miele, G.M. (2007). Substance abuse treatment entry, retention, and outcome in women: A review of the literature. *Drug and Alcohol Dependence*, 86(1), 1-21.
- Grella, C.E., & Greenwell, L. (2004). Substance abuse treatment for women: Changes in settings where women received treatment and types of services provided, 1987-1998. *Journal of Behavioral Health Services and Research*, 31(4), 367-383.
- Griffin III, L.I. & DeLaZerda, S. (2000). *Unlicensed to Kill*. Washington, D.C.: AAA Foundation for Traffic Safety.
- Gudrais, E. (2011). Women and Alcohol. *Harvard Magazine*, July-August, 9-11.
- Insurance Institute for Highway Safety (IIHS). (2001). Status Report. Vol. 36, No. 10, November 15, 2001: ISSN 0018-988X.
- Hedlund, J., Ulmer, R.G., & Northrup, V.S. (2004). *State Laws and Practices for BAC Testing and Reporting Drivers Involved in Fatal Crashes*. Washington, D.C.: U.S. Department of Transportation.

- Hennessey, M. (2008). Treating the female DWI offender. National Centre for DWI Courts. *The DWI Court Reporter*, September 1(3).
- Hien, D.A., Cohen, L.R., Miele, G.M., Litt, L.C., & Capstick, C. (2004). Promising treatments for women with comorbid PTSD and substance use disorders. *The American Journal of Psychiatry*, 161(8), 1426-1432.
- Hingson, R., Heeren, T., Levenson, S., Jamanka, A. & Voas, R. (2002). Age of onset, driving after drinking, and involvement in alcohol-related motor-vehicle crashes. *Accident Analysis and Prevention*, 34, 85-92.
- Hingson, R., Heeren, T., Zakocs, R., Winter, M. & Wechsler, H. (2003). Age of first intoxication, heavy drinking, driving after drinking and risk of unintentional injury among U.S. college students. *Journal of Studies on Alcohol*, 64, 23-31.
- Hu, P., & Reuscher, T.R. (2004). *Summary of Travel Trends: 2001 National Household Travel Survey*. Washington, D.C.: U.S. Department of Transportation.
- Jones, R.K., & Lacey, J.H. (2001). *Alcohol and Highway Safety 2001: A Review of the State of Knowledge*. DOT HS 809 383. Washington, D.C.: U.S. Department of Transportation.
- Johnson, F.W., Gruenewald, P.J. & Treno, A. (1998). Age-related differences in risk of drinking and driving in gender and ethnic groups. *Alcoholism: Clinical and Experimental Research*, 22(9), 2013-2022.
- Kelley-Baker, T., & Romano, E. (2010). Female involvement in U.S. nonfatal crashes under a three-level hierarchical model. *Accident Analysis and Prevention*, 42(6), 2007-2012.
- Kendler, K., Heath, A., Neale, M., Kessler, R., & Eaves, L. (1992). A population-based twin study of alcoholism in women. *Journal of the American Medical Association*, 268(14), 1877-1882.
- Lacey, J.H., Kelly-Baker, T., Furr-Holden, D., Voas, R.B., Romano, E., Torres, P., Tippetts, S., Ramirez, A., Brainard, K., & Berning, A. (2009). *2007 National Roadside Survey of Alcohol and Drug Use by Drivers: Alcohol Results*. DOT HS 811 248. Washington, D.C.: National Highway Traffic Safety Administration.
- Lapham, S.C., Skipper, B.J., Hunt, W.C. & Chang, I. (2000). Do risk factors for re-arrest differ from female and male drunk-driving offenders? *Alcoholism: Clinical and Experimental Research*, 24(11), 1647-1655.
- Lapham, S. C., Smith, E., C'de Baca, J., Chang, I., Skipper, B. J., Baum, G., & Hunt, W. (2001). Prevalence of psychiatric disorders among persons convicted of driving while impaired. *Archives of General Psychiatry*, 58(10), 943-949.
- Laplante, D.A., Nelson, S.E., Odegaard, S.S., LaBrie, R.A., & Shaffer, H.J. (2008). Substance and psychiatric disorders among men and women repeat driving under the influence offenders who accepts a treatment-sentencing option. *Journal of Studies on Alcohol and Drugs*, 69(2), 209-217.

- Lex, B.W., Sholar, J.W., Bower, T., & Mendelson, J.H. (1991). Putative Type II alcoholism characteristics in female third DUI offenders in Massachusetts: A pilot study. *Alcohol*, 8(4), 283-287.
- Lynskey, M., Bucholz, K., Madden, P., & Heath, A. (2007). Early-onset alcohol-use behaviors and subsequent alcohol-related driving risks in young women: A twin study. *Journal of Studies on Alcohol and Drugs*, 68(6), 798-804.
- Maldonado-Molina, M., Reigle, J.M., Delcher, C., & Branchini, J. (2011). The role of parental alcohol consumption on driving under the influence of alcohol: Results from a longitudinal, nationally representative sample. *Accident Analysis and Prevention*, 43, 2182-2187.
- Marelich, W.D., Berger, D.E., & McKenna, R.B. (2000). Gender differences in the control of alcohol-impaired driving in California. *Journal of Studies on Alcohol*, 61(3), 396-401.
- Marsh, J.C., Dingcai, C., & D'Aunno, T. (2004). Gender differences in the impact of comprehensive services in substance abuse treatment. *Journal of Substance Abuse Treatment*, 27, 289-300.
- Maruschak, L. (1999). *DWI Offenders Under Correctional Supervision. Bureau of Justice Statistics Special Report*. NCJ 172212. Washington, D.C.: U.S. Department of Justice.
- Maxwell, J.C. (2011). Drunk versus drugged: How different are the drivers? *Drug and Alcohol Dependence*, doi: 10.1016/j.drugalcdep.2011.08.009.
- Maxwell, J.C., & Freeman, J. (2007). Gender differences in DUI offenders in treatment in Texas. *Traffic Injury Prevention*, 8, 353-360.
- Mayhew, D.R., Warren, R.A., Simpson, H.M., & Hass, G.C. (1981). *Young Driver Accidents: Magnitude and Characteristics of the Problem*. Ottawa: Traffic Injury Research Foundation.
- Mayhew, D.R., & Simpson, H.M., (1990). *New to the Road Young Drivers and Novice Drivers: Similar Problems and Solutions?* Ottawa: Traffic Injury Research Foundation.
- Mayhew, D.R., Warren, R.A., Simpson, H.M., & Hass, G.C. (1990). *Young Driver Accidents: Magnitude and Characteristics of the Problem*. Ottawa: Traffic Injury Research Foundation.
- Mayhew, D.R., Ferguson, S.A., Desmond, K.J., & Simpson, H.M. (2003). Trends in fatal crashes involving female drivers, 1975-1998. *Accident Analysis and Prevention*, 35(3), 407-415.
- Mayhew, D., Simpson, H., & Singhal, D. (2005). *Best Practices for Graduated Licensing in Canada*. Ottawa: Traffic Injury Research Foundation
- McCartt, A., Geary, L., & Berning, A. (2003). Observational study of the extent of driving while suspended for alcohol impaired driving. *Injury Prevention*, 9, 122-137.

- McKay, M. (2010). Commentary: Women and alcohol: Increasingly willing to drive while impaired. *Annals of Emergency Medicine*, 55, 211-214.
- McMurran, K., Riesman, R., Manning, N., Misso, K., & Kleijnen, J. (2011). Interventions for alcohol-related offending by women: A systematic review. *Clinical Psychology Review*, 31, 909-922.
- Mercer, P.W., & Khavari, K.A. (1990). Are women drinking more like men? An experimental examination of the convergence hypothesis. *Alcoholism: Clinical and Experimental Research*, 14(3), 461-465.
- Messina, N., Grella, C.E., Cartier, J., & Torres, S. (2010). A randomized experimental study of gender-responsive substance abuse treatment for women in prison. *Journal of Substance Abuse Treatment*, 38, 97-107.
- Moore, R.H. (1994). Underage female DUI offenders: Personality characteristics, psychosocial stressors, alcohol and other drug use and driving risk. *Psychological Reports*, 74, 435-445.
- National Alcohol Strategy Working Group (2007). *Reducing Alcohol-Related Harm in Canada: Toward a Culture of Moderation*. Available online: [http://www.nationalframework-cadrenational.ca/uploads/files/FINAL\\_NAS\\_EN\\_April3\\_07.pdf](http://www.nationalframework-cadrenational.ca/uploads/files/FINAL_NAS_EN_April3_07.pdf).
- National Highway Traffic Safety Administration (NHTSA). (1998). *National Survey of Speeding and Other Unsafe Driving Action: Volume II. Driver Attitudes and Behaviors*. Available online: <http://www.nhtsa.gov/people/injury/aggressive/unsafe/att-beh/cov-toc.html>.
- National Highway Traffic Safety Administration (NHTSA). (2004). *Strategies for Addressing the DWI Offender: 10 Promising Sentencing Practices – A compendium of promising sentencing practices proposed at the NHTSA National DWI Sentencing Summit at the National Judicial College*, March 15-16, 2004. DOT HS 809 850. Washington, D.C.: U.S. Department of Transportation. Available online: <http://www.nhtsa.gov/people/injury/enforce/promisingsentence/images/10Promising.pdf>.
- National Highway Traffic Safety Administration (NHTSA). (2005). *A Guide to Sentencing DWI Offenders*. 2nd ed. DOT HS 810 555. Washington, D.C.: U.S. Department of Transportation. Available online: <http://www.nhtsa.gov/people/injury/alcohol/dwioffenders/A%20Guide2.pdf>.
- National Highway Traffic Safety Administration (NHTSA). (2006). *Alcohol. Traffic Safety Facts. Research Note. 2005 data*. DOT HS 810 616. Washington, D.C.: U.S. Department of Transportation.
- National Highway Traffic Safety Administration (NHTSA). (2008). *2007 Traffic Safety Annual Assessment – Alcohol-Impaired Driving Fatalities. Traffic Safety Facts. Research Note*. DOT HS 811 016. Washington, D.C.: U.S. Department of Transportation.
- National Highway Traffic Safety Administration (NHTSA). (2009a). *Alcohol-Impaired Drivers Involved in Fatal Crashes, by Gender and State, 2007-2008. Traffic*

*Safety Facts 2009*. DOT HS 811 095. Washington, D.C.: U.S. Department of Transportation.

National Highway Traffic Safety Administration (NHTSA). (2009b). *Alcohol-Impaired Driving. Traffic Safety Facts. Research Note*. DOT HS 811 385. Washington, D.C.: U.S. Department of Transportation.

National Highway Traffic Safety Administration (NHTSA). (2009c). *Traffic Safety Facts 2008 Data*. DOT HS 811 155. Washington, D.C.: U.S. Department of Transportation.

National Highway Traffic Safety Administration (NHTSA). (2010). *Traffic Safety Facts. 2009 Data: Alcohol Impaired Driving*. DOT HS 811 385. Washington, D.C.: U.S. Department of Transportation.

National Institute on Alcohol Abuse and Alcoholism (NIAAA). (1997). *Alcohol Alert No. 35: Alcohol Metabolism*. Bethesda, MD: NIAAA.

National Institute on Drug Abuse (NIDA) (2006). *Principles of drug abuse treatment for justice populations – A research-based guide*. NIH Publication No.06-5316. Available online: [http://www.nida.nih.gov/PODAT\\_CJ/](http://www.nida.nih.gov/PODAT_CJ/).

New Mexico Department of Health (NMDH). (2009). *New Mexico DWI Offender Characteristics and Recidivism Report 2000-2007*. Substance Abuse Epidemiology Section Injury and Behavioral Epidemiology Bureau Epidemiology and Response Division.

Office of National Drug Control Policy. (2006). *Girls and Drugs. A New Analysis: Recent Trends, Risk Factors, and Consequences*. Rockville, MD: Executive Office of the President.

Parks, K.A., Nochajski, T.H., Wieczorek, W.F., & Miller, B.A. (1996). Assessing alcohol problems in female DWI offenders. *Alcoholism: Clinical and Experimental Research*, 20(3), 434-439.

Peck, R. (1993). The identification of multiple accident correlates in high risk drivers with specific emphasis on the role of age, experience and prior traffic violation frequency. *Alcohol, Drugs & Driving*, 9(3), 145-166.

Peck, R.C., Gebers, M.A., Voas, R.B., & Romano, E. (2008). The relationship between blood alcohol concentration (BAC), age, and crash risk. *Journal of Safety Research*, 39, 311-319.

Popkin, C.L., Rudisill, L.C., Waller, P.F., & Geissinger, S.B. (1988). Female Drinking and Driving: Recent Trends in North Carolina. *Accident Analysis & Prevention*, 20(3), 219-225.

Popkin, C.L. (1991). Drinking and driving by young females. *Accident Analysis & Prevention*, 23(1), 37-44.

Rauch, W.J., Zador, P.L., Ahlin, E.M., Howard, J.M., Frissell, K.C., & Duncan, G.D. (2010). Risk of alcohol-impaired driving recidivism among first offenders and multiple offenders. *American Journal of Public Health*, 100(5), 919-924.

- Robertson, A.A., Liew, H., & Gardner, S. (2011). An evaluation of the narrowing gender gap in DUI arrests. *Accident Analysis and Prevention*, 43(4), 1414-1420.
- Robertson, R.D., Holmes, E. & Simpson, H.M. (2010). *Understanding Drunk Driving: Proceedings from the 6th Annual Meeting of the Working Group on DWI System Improvements*. Ottawa: Traffic Injury Research Foundation.
- Robertson, R., Vanlaar, W., & Simpson, H. (2006). *Ignition Interlocks From Research to Practice: A Primer for Judges*. Ottawa: Traffic Injury Research Foundation.
- Romano, E.O., Peck, R.C., & Voas, R.B. (In Press). Traffic environment and demographic factors affecting impaired driving and crashes. *Journal of Safety Research*.
- Royal, D. (2003). *National Survey on Drinking and Driving Attitudes and Behaviors: 2001*. Washington, D.C.: U.S. Department of Transportation.
- Schwartz, J. & Steffensmeier, D. (2007). "The Nature of Female Offending: Patterns and Explanation." In: R. Zaplin (Ed.), *Female Offenders: Critical Perspective and Effective Interventions*. (pp. 43-75). Boston: Jones & Bartlett.
- Schwartz, J., & Rookey, B. D. (2008). The narrowing gender gap in arrests: Assessing competing explanations using self-report, traffic fatality, and official data on drunk driving, 1980-2004. *Criminology*, 46(3), 637-671.
- Shaffer, H.J., Nelson, S.E., LaPlante, D.A., LaBrie, R.A., & Albanese, M. (2007). The epidemiology of psychiatric disorders among repeat DUI offenders accepting a treatment-sentencing option. *Journal of Consulting and Clinical Psychology*, 75(5), 795-804.
- Shinar, D. & Compton, R. (2004). Aggressive driving: an observational study of driver, vehicle, and situational variables. *Accident Analysis and Behavior*, 36, 429-437.
- Shore, E.R., & McCoy, M.L. (1987). Recidivism among female DUI offenders in a Midwestern American city. *Journal of Criminal Justice*, 15(5), 369-374.
- Simpson, H.M., & Mayhew, D.R. (1991). *The Hard Core Drinking Driver*. Ottawa: Traffic Injury Research Foundation.
- Simpson, H., Mayhew, D., & Beirness, D. (1996). *Dealing with the Hard Core Drinking Driver*. Ottawa: Traffic Injury Research Foundation.
- Simpson, H.M., Beirness, D.J., Robertson, R.D., Mayhew, D.R. & Hedlund, J.H. (2004). Hard core drinking drivers. *Traffic Injury Prevention, Special Issue* 5(3), 261-269.
- Skinner, W., O'Grady, C., Bartha, C. & Parker, C. (2004). *Concurrent Substance Use and Mental Health Disorders*. Centre for Addiction and Mental Health (CAMH).
- Snow, R.W. (1996). *Characteristics of Convicted Drunk Drivers Who Attended the Mississippi Alcohol Safety Education Program, 1992-1994: A Statistical Summary*. Mississippi: Mississippi State University.

- Substance Abuse and Mental Health Services Administration (SAMHSA). (2011). *Results from the 2010 National Survey on Drug Use and Health: Detailed Tables*. U.S. Department of Health and Human Services. Center for Substance Abuse Treatment. [www.samhsa.gov](http://www.samhsa.gov).
- Substance Abuse and Mental Health Services Administration (SAMHSA). (2005). *Substance abuse treatment for adults in the justice system: A treatment improvement protocol TIP 44*. U.S. Department of Health and Human Services. Center for Substance Abuse Treatment. [www.samhsa.gov](http://www.samhsa.gov).
- StataCorp. (2010). Stata Statistical Software. Release 11. College Station, Texas: StataCorp LP.
- Sun, A-P. (2006). Program factors related to women's substance abuse treatment retention and other outcomes: A review and critique. *Journal of Substance Abuse Treatment*, 30, 1-20.
- The Dram. (2007). *Comorbidity among Repeat Driving Under the Influence of Alcohol Offenders*: 3(10), 1. The Brief Addiction Science Information Source (BASIS). <http://www.basisonline.org/2007/11/the-dram-vol-31.html>.
- Tsai, V.W., Anderson, C.L., & Vaca, F.E. (2008). Young female drivers in fatal crashes: Recent trends, 1995-2004. *Traffic Injury Prevention*, 9(1), 65-69.
- Tsai, V.W., Anderson, C.L., & Vaca, F.E. (2010). Alcohol involvement among young female drivers in US fatal crashes: Unfavorable trends. *Injury Prevention*, 16, 17-20.
- Underhill, B.L. (1986). Driving under the influence of gender discrimination. *Alcoholism Treatment Quarterly*, 3, 115-125.
- United States Department of Health and Human Services. (1990). *Seventh Special Report to the U.S. Congress on Alcohol and Health From the Secretary of Health and Human Services: Chapter II. Epidemiology*. U.S. Department of Health and Human Services, January, 1990, p.13-37.
- United States Department of Transportation. (2009). *Transportation Secretary Ray LaHood Kicks Off Nationwide Enforcement Crackdown on Impaired Driving Releases New Report Highlighting Increasing Number of Impaired Female Drivers*. Wednesday August 19, 2009. DOT 125-09.
- Voas, R.B. & Lacey, J.C. (2011). *Alcohol and Highway Safety 2006: A Review of the State of Knowledge*. DOT HS 811 374. Washington, D.C.: U.S. Department of Transportation.
- Voas, R.B., Torres, P., Romano, E., & Lacey, J.H. (In Press). Alcohol-related relative risk of driver fatalities and driver involvement in fatal crashes in relation to driver age and gender: An update using 2007 data. *Journal of Studies on Alcohol and Drugs*.
- Walitzer, K.S., & Dearing, R.L. (2006). Gender differences in alcohol and substance use relapse. *Clinical Psychology Review*, 26, 128-148.
- Waller, P. (1997). *Women, Alcohol, and Traffic Safety*. University of Michigan.

- Webster, J.M. Pimentel J.H., Harp, K.L.H., Clark, D.B., & Staton-Tindall, M. (2009). Substance abuse problem severity among rural and urban female DUI offenders. *American Journal of Drug & Alcohol Abuse*, 35(1), 24-27.
- Wells-Parker, E., Pang, M.G., Anderson, B.J., McMillen, D.L., & Miller, D.I. (1991). Female DUI offenders: A comparison to male counterparts and an examination of the effects of intervention on women's recidivism rates. *Journal of Studies on Alcohol*, 52(2), 142-147.
- Wells-Parker, E., Popkin, C.L., & Ashley, M. (1993). Drinking and Driving Among Women: Gender Trends, Gender Differences. In: *Women and Alcohol: Issues for Prevention Research*. (pp.215-239).
- Wells-Parker, E., Popkin, C.L., & Ashley, M. (1996). Drinking and Driving Among Women: gender trends gender differences. In: Howard, J.M., Martin, S.E., Mail, P.D., Hilton, M.E., and Taylor, E.D. (Eds.), *Women and Alcohol: Issues for Prevention Research*. National Institute of Alcohol Abuse and Alcoholism. Research Monograph 32., (p.215-238). National Institute of Health.
- White, A. (2001). *Alcohol and Adolescent Brain Development*. Available online: [http://www.duke.edu/~amwhite/alc\\_adol\\_pf.html](http://www.duke.edu/~amwhite/alc_adol_pf.html).
- White, W. & Hennessey, M. (2006). *Evaluating, Treating and Monitoring the Female DUI Offender*.
- White, J. (2009). *2009 Illinois DUI Fact Book*. DSD A 118.12. Secretary of State. Illinois.
- Wieczorek, W.F., Miller, B.A., & Nochajski, T.H. (1992). The limited utility of BAC for identifying alcohol-related problems with DWI offenders. *Journal of Studies on Alcohol*, 53(5), 415-419.
- Wilsnack, R.W., Wilsnack, S.C., & Klassen, A.D. (1984). Women's Drinking and Drinking Problems: Patterns from a 1981 National Survey. *American Journal of Public Health*, 74(11), 1231-1238.
- Wilson, R. (1991). Subtypes of DWIs and high risk drivers: Implications for differential intervention. *Alcohol, Drugs & Driving*, 7(1), 1-12.
- Zador, P.L., Krawchuck, S.A., & Voas, R.B. (2000). Alcohol-related relative risk of driver fatalities and driver involvement in fatal crashes in relation to driver age and gender. *Journal of Studies on Alcohol*, 61, 387–395.

## NOTES

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