IMPAIRED DRIVING RISK ASSESSMENT

A PRIMER FOR PRACTITIONERS

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EXECUTIVE SUMMARY

Background

Drinking and driving has been widely recognized as a major social problem in Canada for more than three decades. Although a general decreasing trend in the number of persons killed in a traffic crash involving a drinking driver[1] occurred in Canada between 1995 and 2008, the progress achieved since the late 1990s has been nominal and the number of persons killed and injured in crashes involving drinking drivers remains high. In 2010, (the most recent year for which data are available), 33.6% of fatally injured drivers in Canada had a blood alcohol concentration (BAC) in excess of the legal limit of .08 (Brown et al. 2013). In addition, in 2010, 744 people were killed in Canada in road crashes that involved a driver who had been drinking and approximately 2,733 drivers (excluding Newfoundland and Labrador) were involved in alcohol-related serious injury crashes in Canada (Brown et al. 2013).

Similar patterns of nominal or limited declines in drinking and driving are also evident in the United States (U.S.) and Europe as revealed by an examination of crash data. In the U.S., after holding steady between 13,000-14,000 impaired driving fatalities annually for several years, new decreases have been recorded, and fatalities have since dropped to a new low of 10,136 in 2010 and 9,878 in 2011 (NHTSA 2012). It is estimated that there were 31,000 road deaths in 2010 in the European Union (E.U.) and the European Commission estimates 25% of all road deaths in the EU are alcohol-related. It is important to note that comparisons of drink driving crashes and fatalities across countries should be made with caution in light of significant differences in data collection and reporting (ETSC 2011).

In light of these trends, increased knowledge and understanding of the profile and characteristics of impaired drivers, the factors that put them at risk for recidivism, available

1 Reported Canadian national data on alcohol-related crashes resulting in fatalities and serious injuries include all drivers that test positive for any amount of alcohol. This means that drivers that are below the legal limit for impairment as well as those above the legal limit are included in these counts. Hence the term drinking driver is used as opposed to impaired driver.

risk assessment instruments and relevant treatment options can inform the activities of transportation, criminal justice, and health practitioners to better identify, manage, and address this high-risk population in the future.

Introduction

There is increasing recognition of the importance and benefits of tools such as risk assessment and treatment as alternatives to complement punitive measures. Research shows that properly designed strategies and tools developed to match offenders' risks and needs with appropriate programs and interventions have beneficial effects (Bonta 2002; NIDA 2006; Oglaff and Davis 2004), including reductions in recidivism as well as reductions in substance misuse that translate into long-term risk reduction and higher levels of public safety. The use of evidence-informed risk assessment tools and practices is linchpin to making the best use of available resources to achieve greater declines in the magnitude of the problem.

The use of risk assessment instruments has become commonplace to help practitioners in the criminal justice and remedial driver licensing systems to differentiate among various types of impaired drivers, especially those more prone to recidivism. However, to use these tools effectively, it is important that practitioners possess a clear understanding about the most effective ways to apply risk assessment instruments to better manage impaired drivers and to direct them towards appropriate treatment interventions that are built upon best practices.

Purpose and objectives

The purpose of this report is to summarize available knowledge about the profile and characteristics of impaired drivers, relevant risk factors, risk assessment instruments and treatment interventions to treat impaired drivers as well as best practices in this field[2]. It provides an overview of available research regarding the profile of male and female first offenders in relation to repeat offenders and highlights the inability of existing theories of behaviour to adequately disentangle the heterogeneous nature of the impaired driving offender population. It also provides a summary of relevant risk factors that have been linked to repeat impaired driving offences, while acknowledging some of the key limitations of the research in this field. In addition, the report briefly reviews some of the available tools used to assess risk, available treatment interventions that are applicable to impaired drivers, the research relating to their effectiveness, and current best practices for the treatment and rehabilitation of impaired driving offenders in remedial driver licensing programs.

The intent of this report is to provide a high level review of available knowledge that can benefit frontline practitioners working both in the remedial driver licensing system and the criminal justice system. For this reason, additional resources are provided at the end of some

2 There are a broad range of other policies, programs, and interventions for impaired drivers that have been developed, implemented, and evaluated in the past three decades which are beyond the scope of this report.

sections in the full report in order to afford practitioners an opportunity to review relevant research in more depth.

Profile and characteristics of impaired drivers

This section briefly summarizes what is known about the profiles and characteristics of adult impaired drivers and draws from the research in criminology, psychology, transportation, health, addiction medicine, and neuroscience. It first examines what is known about male offenders followed by what is known about female offenders. Key dimensions that are considered include: demographic factors, personality and psychosocial factors, substance misuse including engagement in treatment, mental health, cognitive impairment, and driver and criminal history. In all of these sub-sections, distinctions are drawn between first versus repeat offenders.

Male impaired drivers

Age and sex. Most impaired drivers are between the ages of 20 and 45 years old with almost half of them being between the ages of 20 and 30 years old (Simpson and Mayhew 1991; Jonah and Wilson 1986; Jones and Lacey 2001; Wanberg et al. 2005). Generally speaking, drinking and driving behaviour begins to decrease substantially after the age of 45 years (Hingson and Winter 2003), though this behaviour persists in some drivers into their 60s. Research shows that between 70% and 80% of impaired drivers are male.

Ethnicity. Research spanning 30 years suggests that a majority of impaired drivers are Caucasian, although there has been less research on ethnicity relative to other demographic factors such as age and sex. However, while ethnicity is one of the factors that is linked to impaired driving (Ferguson et al. 2002; Jones and Lacey 2001), differences between populations studied and the ways in which questions have been posed have resulted in inconsistent evidence in relation to this factor (Caetano and McGrath 2005).

Employment and income. Contrary to popular belief, the majority of impaired drivers are employed, although they are more likely to be unemployed relative to the general population (Wanberg et al. 2005). However, it is important to note that these offenders are more often in the lower-to-middle income range (Ambtman 1990; Wilson and Jonah 1985; Nochajski et al. 1993), and they are more apt to experience occupational instability.

Marital status. Research on the marital status of impaired drivers is fairly consistent with some variations. Some studies suggest that more than two-thirds (65-75%) of impaired drivers are single, separated or divorced (Simpson et al. 1996; Wilson 1991; Nochajski et al. 1993). Thus, while approximately half of impaired drivers are in fact married (but perhaps separated), the other half are comprised of those who are currently unmarried or who have never been married. It is important to underscore that many of these studies were conducted

two decades ago at a time when being married was more often equated with having a stable relationship, whereas today this may be less often the case. As such, it may be more useful and practical to consider the level of stability of any co-habiting relationship as opposed to focusing on the specific marital status of this population.

Blood alcohol concentration (BAC). Many impaired drivers possess BACs that are quite high relative to the legal limit in North America of .08 (Simpson et al. 2004; NHTSA 2003). In Canada, the mean BAC among fatally injured drinking drivers is .17 (Mayhew et al. 2011). In the U.S., the average BAC among drivers in fatal crashes is .18 (NHTSA 2010). There is evidence to suggest that while BAC is a good measure of level of alcohol use, it is not a reliable indicator of alcohol-related problems, involvement in impaired driving or risk of recidivism (Wieczorek et al. 1992).

Personality and psychosocial factors. A wide range of personality and psychosocial factors have been examined in relation to impaired drivers including sensation-seeking, hostility, aggression, psychopathic deviance, assertiveness, antisocial personality, impulse control, risk perception, narcissistic personality, intermittent explosive disorder, external locus of control (i.e., blaming others for problems), and emotional adjustment. In particular, a comprehensive review by Wanberg et al. (2005) reported that the "most salient personality variables associated with [DWI] behaviour include: agitation, irritability, resentment, aggression, overt and covert hostility; thrill and sensation-seeking; low levels of assertiveness, low self-esteem, feelings of inadequacy, and sensitivity to criticism and rejection; helplessness, depression, and emotional stress; impulsiveness, external locus of control (blame others for problems); social deviance and non-conformity, anti-authoritarian attitudes" (p.23).

Alcohol misuse. The role of alcohol misuse in relation to impaired driving behaviour has been studied more than almost any other factor. However, while older research has suggested that substance-related problems were a critical factor in impaired driving offending, more recent research has determined that, although substance use is strongly correlated with impaired driving behaviour, it is not a causal factor.

- It has been well-established over the past 35 years that early onset of alcohol and other drug use are predictive of substance use and abuse in adulthood (Hingson et al. 2002; 2003; Grant and Dawson 1997; Wanberg et al. 2005). Generally speaking, those individuals who begin drinking at an early age (under the age of 14) often consume more alcohol as compared to those who begin drinking in their late teens or at the age of 21 (the U.S. legal drinking age).
- Research shows that there are two characteristics related to family history that are the most strongly associated with number of impaired driving offences as an adult. These include: having a father with a drinking problem (Schuckit 1999; 2009);

and having a relative who was arrested for impaired driving (McMillen et al. 1992; Wieczorek and Nochajski 2005).

- Research investigating the drinking patterns of impaired driving offenders reveals that these individuals generally consumed greater amounts of alcohol per occasion and also consumed alcohol more often than the general population of drinkers (Beirness et al. 1997). There is also research to indicate that a majority of impaired drivers are, in fact, binge drinkers (Caetano and McGrath 2005; Chou et al. 2006). These findings challenge a popular belief that alcoholism is at the root of impaired driving behaviour.
- Some research suggests that a diagnosis of alcohol abuse (as opposed to alcohol dependence) is more common among first offenders than repeat offenders, suggesting that this group may generally have lower levels of problem severity relative to repeat offenders (Wieczorek and Nochajski 2005).
- Many offenders, regardless of their number of prior offences, are assessed as being in the pre-contemplative stage in relation to the stages of change with regard to their drinking and driving behaviour[3]. There is also research demonstrating that impaired driving offenders may be more defensive of their drinking behaviour, and more resistant to self-disclose the extent of their alcohol consumption (BHRCS 2007) than the average patient who engages in alcohol treatment.
- A comparison between impaired driving offenders who completed mandated remedial programs versus those who were non-compliant indicated that the latter group possessed the following characteristics: older, lower income in last 30 days, less likely to be married or with a partner, unemployment, similar drinking patterns, more cocaine dependence, higher proportion of positives on axis 1 disorders (e.g., anxiety, depression), and higher proportion of antisocial personality features. Logistic regression further revealed that unemployment was the main predictor of non-compliance (Nadeau 2010), suggesting that cost may be a major obstacle to increased participation among poorer offenders.

Mental health. A broad range of mental health and psychiatric conditions have also been linked to impaired driving offenders including antisocial personality disorder, anxiety, conduct disorder, impulse control disorder, narcissism, depression, post-traumatic stress disorder (PTSD), and bipolar disorder. Recognition of and interest in these factors has grown in the past decade, and even more recently as a result of the large number of soldiers and veterans

3 The transtheoretical stages of change model posits that individuals with behaviour problems, such as substance dependence, experience several conditions and differ in their willingness to acknowledge that they have a problem and work towards change (Alexander 2000). Interventions or treatment strategies are most likely to be successful when geared toward the stage of change that the individual client is in. Adapted from Prochaska et al.'s (1992) readiness for change process stages, the various stages include: 1) Pre-contemplation (lack of awareness of a problem; no contemplation of change); 2) Contemplation (recognition of a problem; contemplation of change); 3) Preparation (consideration of behaviour change); 4) Action (taking steps to change behaviour such as participation in treatment); and, 5) Maintenance (relapse prevention).

that are involved in impaired driving events either overseas or upon their return to North America.

A number of research studies suggest that psychiatric disorders are higher among impaired drivers (Shaffer et al. 2007; Lapham et al. 2001; McMillen et al. 1992; Wieczorek and Nochajski 2005). Stress is also considered an important factor in relation to impaired driving behaviour (Wanberg et al. 2005). Research examining the effects of anxiety disorder in relation to substance use has also produced significant findings that may have important implications for impaired drivers (Kushner et al. 2011). Many impaired drivers have substantial histories of drug use (Beirness and Davis 2008). Rates of drug use among first and repeat offenders are not only important but also are not limited to "soft" drugs like marijuana.

Cognitive impairment. Executive cognitive function "involves the set of abilities that allows one to select behaviour appropriate to a situation, including the ability to inhibit inappropriate behaviours and to focus on a specific task in spite of distraction" (Brown et al. 2008, p. 115). Deficits are linked to impulse control and self-regulation, capacity to learn and retain intervention content, problem solving, abstracting, and the speed of information processing, among other abilities. Preliminary studies of neurocognitive characteristics of first-time offenders indicate that they are more likely to suffer deficits related to executive cognitive function compared to normal drivers (Brown et al. 2010a; Couture et al. 2010, August).

Driver and criminal history. Research has demonstrated that a significant proportion of impaired driving offenders may also have a history of other driving violations as well as other criminal history. In particular, the propensity for other driving and criminal offences appears to be more pronounced among repeat offenders (Simpson et al. 1996; Jones and Lacey 2001; Syrcle and White 2006; Wieczorek and Nochajski 2005). Impaired driving is likely not an isolated high-risk driving behaviour in some offenders, meaning that some individuals who drive while impaired may also have a history of other unsafe and/or high-risk driving behaviours (Beirness et al. 1997). Moreover, reliance solely on driving records to identify these drivers is problematic in light of gaps in reporting and record systems (Simpson and Robertson 2001; Nochajski and Stasiewicz 2006). Studies investigating criminal history of these offenders also illustrate that at least a portion of convicted impaired drivers have a history of other criminal offences and suggest that strengthening linkages between the criminal justice system and impaired driver treatment programs may be beneficial.

Repeat and/or hard core[4] impaired drivers. This segment of the impaired driver population generally has many similar characteristics to first impaired drivers, however these characteristics are often more pronounced (Wieczorek and Nochajski 2005).

- Research shows that some 90% of recidivists are male and between the ages of 23 and 45 years.

4 Hard core impaired drivers, also known as hard core drunk drivers are defined as drivers who drink and drive repeatedly, often at high blood alcohol concentrations, and have a history of prior convictions for impaired driving and or substance abuse problems.

- While a majority of repeat offenders can be classified as Anglo-white (Jones and Lacey 2001; Wanberg et al. 2005), it has also been suggested that ethnicity is related to repeat impaired driver status, however this varies according to region.
- Repeat offenders are more often single, separated, or divorced, have less education, lower levels of income, and have higher levels of unemployment in comparison to first offenders.
- Finally, among repeat offenders, arrests at higher BACs of .18 or over .20 are more common compared to first-time offenders (Wanberg et al. 2005), as is test refusal at the roadside (Robertson and Simpson 2002).
- Findings from the literature exploring personality differences between first and repeat offenders are mixed. Some studies report that repeat offenders demonstrated higher levels of hostility, sensation-seeking, psychopathic deviance, mania and depression, and antisocial tendencies, as well as lower levels of assertiveness and emotional adjustment, self-esteem, locus of control, social desirability (McMillan et al. 1992; Wieczorek and Nochajski 2005; Cavaiola et al. 2007). Other studies have failed to identify significant differences between these two groups (Cavaiola and Wuth 2002; Wanberg et al. 2005). These apparently contradictory conclusions reveal the fact that the research to date has failed to adequately disentangle the significant heterogeneity observed in the impaired driver offender population. Socially desirable responding among impaired drivers in self-report studies may also bias our understanding of personality and behavioural factors (Schell et al. 2006).
- Similar to first offenders, age of onset, family history, and alcohol misuse issues play an important role in relation to repeat impaired driving offenders. A comprehensive review of the literature by Wanberg et al. (2005) similarly reported that repeat offenders have higher levels of disruptive alcohol use symptoms.
- Repeat offenders have significantly higher levels of psychiatric symptoms (Wieczorek and Nochajski 2005; Wanberg et al. 2005; Jones and Lacey 2001; Simpson et al. 1996). It has been reported that there are significant differences in drug use by the number of prior offences and persistent offenders have higher levels of use than first offenders (Wieczorek and Nochajski 2005; Wanberg et al. 2005; White and Gasperin 2006). Mental health issues among impaired drivers are an important consideration given that treatment is more difficult when individuals possess emotional and psychiatric problems in conjunction with substance-related problems (Lapham et al. 2001). Hence, not only can co-occurring disorders decrease the effectiveness of treatment, but they are also considered a predictor of poorer treatment outcomes (Lapham et al. 2001; Laplante et al. 2008; Shaffer et al. 2007).

- Research reveals that repeat offenders are more likely to possess cognitive impairments. The most intervention-resistant offenders have a decreased ability for self-regulation, for learning and retaining intervention content, and for exercising good decision-making even when sober. Not all of these problems are attributable to alcohol abuse severity. This suggests that new strategies in the design of remedial programs and interventions directed at some offenders with the highest risk of recidivism may be needed (Ouimet et al. 2007; Maldonado-Bouchard et al. 2012; Brown et al. 2008).
- Repeat offenders are also more likely to have more traffic offences and to have been involved in crashes more frequently than drivers that are convicted of a first impaired driving offence (McMillen et al. 1992; Nochajski and Wieczorek 2000; Wieczorek and Nochajski 2005) according to official records and/or self-report.

Female impaired drivers

For several decades, road safety research has demonstrated that fatalities and injuries related to road crashes (due to alcohol or other unsafe driving behaviours) have predominantly involved males (Mayhew et al. 1981; Beirness and Simpson 1988; Mayhew and Simpson 1990; Mayhew et al. 1990; Kelley-Baker and Romano 2010).

In Canada, since 2002, females have accounted for 13-16% of fatally injured impaired drivers, reaching a high of 16.4% in 2006 (TIRF 2012). However, this percentage seems to have stabilized in the past four years, and, overall, females continue to account for a minority of this population. An examination of alcohol crash data from the U.S. Fatality Analysis Reporting System (FARS) indicates that the involvement of female drivers in alcohol-impaired road crashes has remained fairly stable with incremental increases from 12% in the 1980s to 14% in the 2000s. Since 2006, the percentage of women drivers who tested positive for any amount of alcohol in fatal crashes has averaged 16% annually, while in 2008 1,837 fatalities in crashes involved an alcohol-impaired female driver (NHTSA 2009).

Conversely, impaired driving incident and arrest data reveal a different picture. In Canada, the impaired driving rate for females generally declined up to 1997 and remained stable through to 2005. It has for the most part increased since 2005 and in 2011, females accounted for one in every six impaired drivers, compared to 1 in 13 in 1986 (Perreault 2013). In the United States, the number of female impaired driving arrests in the U.S. rose nationally by 28.8% between 1998 and 2007 (Lapham et al. 2000; Schwartz and Rookey 2008). Thus, while in the 1990s it was estimated that about 10% of impaired drivers were female, as of the 2000s it has been estimated that women account for closer to 20% (Wanberg et al. 2005; Schwartz and Rookey 2008).

There are three main hypotheses that explain these increases. Female roles in society have changed considerably (Popkin 1991; Bergdahl 1999; Mayhew et al. 2003; Robertson et al. 2011a; Tsai et al. 2008), there have been changes in social norms (Gudrais 2011; Popkin 1991), and also changes in social control mechanisms (Farrow and Brissing 1990; Robertson et al. 2011a; Schwartz and Rookey 2008; Schwartz and Steffensmeier 2007).

Although much of the research investigating female impaired drivers is dated (Robertson et al. 2011b), in 2013 a series of case studies were conducted with more than 150 convicted female impaired driving offenders who participated in interview focus groups in four U.S. states (California, Michigan, Missouri and New York) (Robertson et al. 2013). In particular, three distinct profiles of female impaired drivers also emerged from this study, and it is estimated that more than three-quarters of the study participants matched one of these profiles:

1. Young women who drink in order to 'fit in' and consume alcohol and/or binge drink at house parties and bars;
2. Recently married women with spouses who drink or who have children and drink following the birth of their children as a means for coping with loneliness; and,
3. Divorced older women and/or "empty nesters" who begin to drink later in life (after age 40) following a catalyst such as the death of a parent, end of a marriage, or children leaving home.

Age and sex. Robertson et al. (2013) found that female impaired driving offenders ranged in age from late teens to mid-60s, suggesting that women of all ages drink and drive. However a majority of participants were an estimated 20 to 40 years of age. Generally, rates of involvement in alcohol-impaired motor vehicle crashes decrease with age, and the population of greatest concern is often young females (Peck et al. 2008). In particular, the increasing involvement of young women with alcohol, in combination with their inexperience driving and their growing propensity for risky driving (Lynskey et al. 2007; Tsai et al. 2010) warrants attention and further research.

Education and employment. The literature regarding levels of education and employment among female impaired drivers is inconsistent. Female impaired drivers are generally older than men and have higher levels of education (Peck et al. 2008) but lower paying jobs (Chalmers et al. 1993; Shore and McCoy 1987). Low academic achievement in young females represents a risk factor for impaired driving comparable to that observed in males (McMurran et al. 2011).

Marital status. A significant proportion of female impaired drivers are single, divorced, or separated, or are more likely to be living with a partner with an alcohol problem compared to women with no past impaired driving offences (McMurran et al. 2011; Chang et al. 1996;

Shore and McCoy 1987; Argeriou et al. 1986). In fact, when compared to male impaired drivers, females 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). Generally speaking, female impaired drivers are more likely to be the primary caretaker of children at the time of arrest, are more likely to have experienced abuse, and are more likely to have physical and mental health needs compared to their male counterparts (Bloom et al. 2003).

Personality and psychosocial factors. In contrast to the availability of research examining this issue among male impaired drivers, there have been fewer studies examining the prevalence of personality and psychosocial factors among female impaired drivers. A review of these studies suggests that psychosocial problems among female impaired drivers may not be uncommon and that, at least a portion of these women may experience depression, boredom, and problems at home and school that are related to their drinking (McMurran et al. 2011).

Alcohol misuse. Alcohol use among women is a very important factor to consider in relation to impaired driving for several reasons. Research shows that women metabolize alcohol differently than men (Gudrais 2011; Greenfield 2002). In addition, females generally have less water in the body and a lower body mass. 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). It is also important to note that a study by Elliott et al. (2006) found that women are more vulnerable to all types of traffic incidents following alcohol consumption.

- Most recently, Robertson et al. (2013) reported that the extent of substance use varied substantially across study participants. It is estimated that almost one-half of women reported early onset of drinking with many experimenting with alcohol and/or drugs in their early or mid-teen years; the lowest reported age of onset drinking was nine years old. Conversely, it was estimated that between one-quarter and one-third of women did not begin to regularly use or develop a problem with alcohol or drugs, or begin to drive after using these substances, until they were in their 30s or 40s.
- A constellation of family history factors, including a history of alcoholism within the family, experience with abuse, anxiety and depression, and family and personal relationships that encouraged heavy drinking (White and Hennessey 2006), are associated with female impaired driving offending to varying extents, however the specific influence of each factor is unclear.
- Estimates of alcohol diagnoses among female impaired drivers vary but are significant and comparable to or greater than males (Lapham et al. 2000; Maxwell and Freeman 2007; Maxwell 2011). In a study by Robertson et al. (2013) a universal

theme that emerged in interview focus groups with more than 150 convicted female impaired drivers was reports that they drank for emotional reasons, or that alcohol consumption was a coping mechanism to help them manage their emotions and stress.

Mental health. Findings indicate that there is a need to treat some female impaired drivers not only for alcohol misuse problems but mental health problems as well (McMurran et al. 2011). Female impaired driving offenders have significantly higher psychiatric co-morbidity relative to their male counterparts (Laplante et al. 2008). Diagnoses of anxiety, depression, and post-traumatic stress disorder (PTSD) are common among female impaired driving offenders. Histories of trauma are also not uncommon among female impaired drivers (Robertson et al. 2013).

- The use of illicit and licit substances among female impaired drivers is prevalent. Some studies suggests that involvement in drug use may be more comparable among males and females (Lapham et al. 2000). However, Maxwell and Freeman (2007) reported that the use of illicit drugs was higher among females as compared to males, noting that females 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). More recently, Robertson et al. (2013) reported that, although prescription drug use was common, less than one-third of female impaired drivers reported use of illicit substances. Given that the use of drugs appears to be somewhat common among female impaired drivers, it is important that female offenders are appropriately screened, identified, and treated for all drug use disorders.

Cognitive impairment. While there has been limited research into the prevalence of cognitive impairments among female impaired drivers, Brown et al. (2013) reported that executive control appears to be a feature of female first impaired driving offending and that their ability to identify goals, plan, execute, inhibit old behaviour patterns, and learn from experience is reduced. These impairments worsened with alcohol intake. As such, alcohol appeared to contribute to female first impaired driving offending through acute and chronic disruption of executive control functioning.

Driver and criminal history. There are limited data to suggest that a smaller number of female impaired driving offenders relative to males have a history of other traffic offences or criminal offences, although more research into this topic is needed. Common criminal offences in females may include drug offences, theft offences, and assault (Caldwell-Aden et al. 2009).

Repeat female impaired drivers. Female repeat impaired driving offenders often share similar characteristics to their male counterparts.

- Older research suggests that repeat female offenders are approximately 30 years old but more current research on this issue is needed.
- Similar to males, there is also evidence that this population has lower levels of education, employment, and income, and is much more likely to be single, separated, or divorced than first offenders.
- Like their male counterparts, repeat female impaired driving offenders are more likely to drink more frequently and exhibit higher levels of impairment, more often abuse drugs, and utilize treatment services (Argeriou et al. 1986).
- However, there are some differences between female and male repeat offenders. For example, repeat female impaired driving offenders have higher levels of psychiatric co-morbidity than male repeat offenders and are more likely to also use drugs (Laplante et al. 2008; Maxwell 2011).
- Recidivism rates among male and female impaired drivers show some consistent patterns, depending on the studies consulted. Available data suggest recidivism risk may be higher for young males than females (Argeriou et al. 1986; Jones and Lacey 2001; McMurran 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 sexes age (Lapham et al. 2000). However, a comparison of rates among older offenders revealed few differences between sexes (Laplante et al. 2008; Rauch et al. 2010). As relatively few studies have specifically examined this issue, more research is needed.

Summary of similarities and differences between males and females

On average, impaired drivers of both sexes are generally aged 20 to 40, with many offenders being in their 30s. Relative to the general population, impaired drivers of both sexes also are more likely to have less education and lower levels of employment and income; this finding is more pronounced among repeat offenders. Similarly, impaired drivers of both sexes are more likely to be single, separated, or divorced. Again, this finding is more pronounced among repeat offenders.

Alcohol-related diagnoses are very common among impaired drivers of both sexes. In particular, the age of onset of drinking and family history warrant attention. To reiterate, while such diagnoses are highly correlated with impaired driving offending, they are not necessarily a causal factor. Both male and female impaired drivers have higher levels of psychiatric symptoms relative to the general population so co-occurring disorders should not be overlooked during screening and assessment of this population. Moreover, recidivism rates for impaired driving among men and women of adult age appear similar following a first alcohol-related conviction.

There are also some important differences between male and female impaired drivers. Men appear to exhibit a higher degree of antisocial attitudes and behaviours relative to women, although research comparing these populations on this dimension is sparse. Conversely, women experience more severe psychological and mental health symptoms as well as report greater involvement in drugs. Men may be more defensive about alcohol problems and, in particular, repeat male impaired drivers may demonstrate a greater readiness for change.

In addition, younger males appear to have higher recidivism rates relative to females in this age category. Male impaired drivers also have more extensive histories of driving offences and other criminal offences as well as more prior experience with impaired driving interventions.

Impaired driving risk factors

Risk factors are characteristics that are identified (according to sufficient research evidence) to be indicators of the potential for a group of individuals with shared characteristics to engage in a specific behaviour in the future. It cannot be underscored enough that "understanding the factors associated with recidivism is critical to our capacity for better detection of high-risk offenders and our ability to orchestrate effective countermeasures" (Ouimet et al. 2007, p. 743).

Generally speaking, risk factors are organized in two distinct categories: 1) static factors (e.g., number of prior offences) that cannot be changed; and, 2) dynamic factors (e.g., substance abuse) which may change over time (Gendreau et al. 1996; DeMichele and Lowe 2011). Again, risk factors are relative to a group and not an individual and, subsequently, these measures are not very robust (Nadeau 2010).

Risk assessment is a process that utilizes identified risk factors (usually in relation to multiple domains) to predict future behaviour. Risk assessment is not an exact science and risk factors only provide insight into the probability or likelihood of recidivism of offenders based upon existing research that is available. In this regard, much of the research around risk prediction has focused on criminal offenders and, in particular, those who have committed violent and/or sexual offences.

More recently, the quality of instruments[5] used with offenders has greatly improved (to Andrews and Dowden 2006) as our understanding of risk factors has grown. Risk assessment instruments that possess a higher degree of accuracy in prediction generally account for multiple risk factors to reach a determination as to the probability of recidivism, and place a greater emphasis on objective measures as opposed to just the reliance on professional judgment which is more often subjective.

A broad range of risk factors have been noted in the literature regarding impaired drivers including: sex, age, marital status, socio-economic status, history of prior treatment, impaired driving history, criminal history of violent aggression, prior traffic offences, test refusal or

5 It is equally important that risk assessment instruments demonstrate proven reliability and are scientifically validated and standardized on an appropriate population.

high-BAC, and drinking patterns to name a few (Syrcle and White 2006). Yet, these studies vary dramatically in terms of the population studied, sample size, variables and measures utilized, data sources, analyses conducted, comparison groups employed, the time period used to measure recidivism, and the interpretation of results. Moreover, the number of studies that have examined the reliability of each individual risk factor is relatively small, which makes the drawing of conclusions a challenge.

In light of the limitations associated with research investigating risk factors associated with impaired driving, what is currently known about impaired driving risk factors should be interpreted cautiously. At best, no single impaired driving risk factor provides a clear indication regarding the potential for future impaired driving recidivism. Collectively, however, these risk factors may provide some insight that enable practitioners to gauge the need to further explore individual cases and the need for more intensive interventions.

In brief, there is some limited evidence to support the use of the following factors as predictors of impaired driving recidivism among males:

- younger age;
- male sex;
- life history including family members or spouses with alcohol problems or impaired driving arrests;
- early onset alcohol and drug use and abuse, frequency of drinking, amount of alcohol consumed;
- BAC is often cited as a reliable predictor of recidivism but research findings are mixed and more recent research suggests that BAC alone is not useful and should be interpreted cautiously or in combination with other predictive variables (Caviola et al. 2007; Dugosh et al. 2013);
- Instruments with some strength in predicting recidivism include the MAST, the MAC scale of the MMPI, and the subtle items of alcoholism on the RIASI. Of importance, different jurisdictions or offender samples will have higher or lower rates of failing, and agencies need to make decisions about how to balance the positive and negative predictions. That is, assessment is an exercise in prediction, and prediction has error. It is a bit of an art to balance these issues, but also a matter of agency capacity. The bottom line is that because of decisions regarding instrument precision, practitioners should be careful about comparing different assessments and even the same assessment across different populations;
- Biomarkers can detect the presence of alcohol disorders fairly accurately and a number of studies have investigated the extent to which biomarkers are predictive

of impaired driving recidivism. More recently, there is research to suggest that biomarkers are not a good predictor of recidivism, individually or as a group. The primary reason for this is that biomarkers may not capture the drinking patterns that are most common among impaired driving offenders – e.g., binge drinking (Couture et al. 2010);

- A poor driving record that includes offences both prior to and following the initial impaired driving offence is predictive of recidivism (Peck et al. 1994; Rauch et al. 2002; Wieczorek and Nochajski 2005; Cavaiola et al. 2007). However, some have noted that prior impaired driving arrests may not be a good predictor as the presence of prior arrests is influenced to a large extent by the level of impaired driving enforcement as well as the length of the "look-back" period for counting prior arrests (Nochajski and Stasiewicz 2006);
- Research investigating risk factors associated with criminal re-offending has identified a number of objective and verifiable risk indicators that are useful to distinguish between first and repeat impaired drivers. These variables are associated with an offender's criminal history and include: "age at time of first arrest for any criminal act, age at time of first impaired driving conviction, having a prior summary of alcohol- or drug-related offence, having a prior misdemeanor offence, having a misdemeanor offence for a crime against persons, or having five or more prior moving violations" (Dugosh et al. 2013, p.8);
- Research suggests that a high rate or pattern of BAC fail readings from the alcohol interlock, particularly in excess of .02, is predictive of the likelihood of impaired driving recidivism (Marques et al. 2003; Beirness and Marques 2004). Researchers have also determined that the presence of elevated BAC tests during early morning hours can also assist in predicting future impaired driving offences (Beirness and Marques 2004); and,
- A number of recent studies have identified risk factors among repeat offenders in comparison to first offenders (Nadeau 2010). Low levels of participation or involvement in treatment and treatment interventions is considered predictive of recidivism (Aharonovich et al. 2003; Crews et al. 2005; Syrcle and White 2006; Wanberg et al. 2005). Neurocognitive deficits have also been reported as predictive of recidivism among repeat offenders. More specifically, these deficits can contribute to variation in affect, impulsivity, problem solving, perception and memory (Glass et al. 2000; Ouimet et al. 2007). Finally, a reduced ability to change is also predictive among repeat offenders of future impaired driving offences (Buntain-Ricklefs et al. 1995; Glass et al. 2000; Ouimet et al. 2007).

With regard to female impaired drivers, there is one key study that examined differences in risk factors among men and women. For the most part, few differences were found in terms of predictive variables with the exception that women were more likely to report a history of aggressive behaviour towards a partner than were males, and this indicator was associated with increased recidivism (Lapham et al. 2000).

While it is clear that a wide range of risk factors have been examined in relation to the prediction of repeat impaired driving offences in the past two decades, the findings from this research are inconsistent in many cases and far from conclusive. There are only a small handful of common factors that have been investigated across several studies, however with regard to criminological research, more is known about risk factors among repeat drunk drivers. For these reasons, practitioners in the field are encouraged to take a broader view of and approach to the use of these factors, and focus on the presence of a number of risk factors collectively as a basis to inform decisions, as opposed to the presence or absence of individual factors. Much more research on this issue is needed before definitive conclusions can be reached.

Risk assessment instruments

The effective management of the many different types of impaired drivers is based upon the identification and development of a range of supervision strategies and interventions specifically geared towards those offenders who are more or less amenable to behaviour change. This is a fundamental principle of evidence-based practices. Of considerable importance, the use of valid and reliable risk assessment instruments is essential to accurately differentiate between the different types of impaired drivers that exist and ensure that they are streamed into appropriate interventions designed to address their specific risks and needs.

These assessment tools are designed to identify as many potential cases as possible, while at the same time minimizing the number of false-positives (i.e., identifying someone as "high-risk" for re-offending when they are not). Some of these instruments are not as strong and have demonstrated limited validity and reliability in relation to the accurate prediction of future impaired driving events, including the following:

- Mortimer Filkins (MF) (Chang et al. 2002; Wendling and Kolody 1982); and,
- Driver Risk Inventory (DRI) (Chang et al. 2002).

In light of the strengths and weaknesses associated with many of the available instruments, many jurisdictions rely on the outcomes of several instruments during the assessment process in order to produce a more complete picture of impaired driving offenders.

The full report briefly describes some of the instruments that are most commonly used across Canada and the United States. Each instrument is described in terms of type

of administration, who it can be administered by, number of items, time required for administration, training required for administration, scoring, summary of psychometrics, limitations, cost, and source. In addition, a few key references are identified in relation to each instrument in order to provide additional information to practitioners seeking more knowledge about the risk assessment instrument.

The following is a list of the instruments described in the full report:

- ADS (Alcohol Dependence Scale);
- ASUDS-R (Adult Substance Use and Driving Survey – Revised);
- ASI (Alcohol Severity Index);
- AUDIT (Alcohol Use Disorders Identification Test);
- IDTS (Inventory Drug-Taking Situations);
- DAST (Drug Abuse Screening Test);
- LSI-R (Level of Service Inventory-Revised);
- MAST (Michigan Alcoholism Screening Test);
- SASSI (Substance Abuse Subtle Screening Inventory);
- RIASI (Research Institute on Addiction Self Inventory); and,
- Biomarkers.

There are no clear indications of the superiority of any one screening instrument or set of instruments and procedures. To summarize, there are many impaired driver assessment instruments that are available and utilized across North America. Yet not all of these instruments have been validated on an impaired driver population and few have undergone rigorous or independent evaluation efforts. It is for this reason that many jurisdictions rely upon a combination of these instruments to guide the assessment process.

It is essential to underscore that problem substance use behaviour in and of itself is not the source or cause of persistent impaired driving behaviour, but instead merely a correlate of it. Therefore while assessment instruments designed to identify the likelihood of relapse among substance using and even impaired driving populations provide valuable information, these tools frequently overlook the role of criminogenic and socio-psychological factors that are important contributors to chronic offending.

Of the available risk assessment instruments to date, both the LSI-R and ASUS[6] instruments appear to be the most well-grounded in theory and based upon a solid theoretical

6 The Adult Substance Use Survey (ASUS) is a self-report survey that consists of 64 items designed to assess an individual's perceived alcohol and drug use. The survey also provides a brief mental health screen. It can either be self-administered (paper-and-pencil) or administered orally by a practitioner. Unlike the ASUDS-R, this screening instrument is not specific to an impaired driving offender population although both tools were developed by the Center for Addiction Research and Evaluation (CARE).

foundation. These instruments incorporate a range of recognized concepts stemming from several relevant disciplines including criminology, psychology, sociology and addictions, and these concepts have been repeatedly tested and validated through extensive research. Such a comprehensive approach is essential in light of the well-documented complexity associated with impaired driving behaviour and the diversity of underlying processes that have been used to explain persistent offending by this population. It should be underscored that assessment approaches that are multi-trait and multi-method provide more accurate results (Campbell and Fiske 1959).

Looking forward, there is some clear direction as to ways to strengthen research that can guide the development of empirically-based risk assessment instruments. First, with regard to the evaluation of risk assessment instruments, Brown and Ouimet (2013) underscore that "Longer duration perspective evaluations of assessment protocols for prediction of recidivism are urgently needed" (p.311). Second, the research undertaken by Dugosh et al. (2013) provides a basis to begin to integrate criminological theories and empirically-based risk factors to enhance risk assessment tools for impaired drivers. The inclusion of these factors in risk assessment tools can help to strengthen the internal validity of them.

Treatment interventions

Alcohol education programs for impaired drivers show an average reduction in recidivism of approximately 10% (NHTSA 1986; Wells-Parker et al. 1995). Among offenders who suffered from some degree of substance misuse problems, those programs that utilized a therapeutic approach are considered to have a greater effect, illustrating the value of treatment as an intervention to encourage rehabilitation and behaviour change (Wanberg et al. 2005).

The results of a risk assessment in conjunction with resources that are available are two critical components of any intervention strategy. There is growing evidence to suggest that combining appropriate sanctions and supervision with treatment interventions can be more effective than either strategy alone. The partnering of these different strategies can expand opportunities to achieve long-term risk reduction and to reduce and/or prevent repeat offending. In order to maximize the effectiveness of this approach it must be assessment driven and combine appropriate levels of supervision with appropriate treatment interventions.

The full report briefly describes a variety of common approaches to treatment including:

- screening and brief interventions (SBI);
- motivational interviewing (MI);
- cognitive behavioural therapy (CBT);
- pharmacological interventions; and,

- web-based interventions.

Each intervention is described in terms of purpose and objectives, general effectiveness, staff training requirements, mechanism of delivery, and strengths and weaknesses. Note that some of these interventions have been specifically evaluated on an impaired driving population whereas others are merely a source of emerging interest and more research is needed to gauge effectiveness with impaired drivers. In addition, a few key references are identified in relation to each intervention in order to provide additional information to practitioners seeking more knowledge about specific strategies.

In summary, there is a range of treatment interventions that have been shown to be promising or effective in reducing recidivism among impaired driving offenders. However, each of these strategies rely upon different levels of resources, staff with different backgrounds and qualifications, different amounts of time, and have varying levels of cost. In addition, some interventions are more easily implemented and delivered than others. Perhaps what is most important is that efforts are made to best match interventions to the individual risks and needs of each offender.

Best practices for treatment and rehabilitation of impaired driving offenders

Health Canada produced a Best Practices report (2004) that was based upon a thorough literature review, consultation with experts, and interviews with key informants. The aim of the report was to compile current knowledge on driving while impaired remedial programs across Canada.

Specifically, the report addresses the planning and delivery of education programs and treatment and rehabilitation programs. The report in its entirety can be found online: http://www.hc-sc.gc.ca/hc-ps/alt_formats/hecs-sesc/pdf/pubs/adp-apd/bp_treatment-mp_traitement/treatment_rehab_driving_impaired_practices.pdf

Research gaps and future needs

Much has been learned about the profile and characteristics of impaired drivers over the course of the past three decades. To a lesser extent, knowledge has also grown with regard to the factors that put them at risk, the types of assessment instruments that are appropriate for this population, and the types of treatment interventions that can begin to address their risks and needs.

Still, continued efforts are needed to increase understanding of these topics and to inform approaches that can best prevent impaired driving behaviour, as well as manage, supervise and treat those that are detected and processed through the criminal justice system. A

number of topics that reflect gaps in offender research, gaps in intervention research, and gaps in implementation and practice warrant future attention.

- Perhaps most pressing in the field of research is the need to integrate existing knowledge stemming from diverse disciplines as a basis to explore and develop more holistic, robust and complex models of impaired driving behaviour that acknowledge the heterogeneity of this population. A core feature of this initiative should be to increase understanding of the interactions and effects of different characteristics of offenders.
- Greater knowledge and understanding of relevant risk factors that influence future offending is also a critical need.
- The development of valid, reliable and practical screening and risk assessment instruments that can accurately distinguish between offenders not only with regard to risk related to substance use but also risk of re-offending and individual-specific trajectories to impaired driving behaviour are essential to inform decision-making and the allocation of resources.
- Future efforts to investigate the effectiveness of interventions must account for not only the increasingly complex environment in which such interventions are delivered, but also the web of factors that play an important role.
- A range of research questions remain that must be addressed. These include:
  - Is it possible to achieve an optimal balance between sanctions/supervision and rehabilitation/treatment for offenders with different levels of risk?
  - What interventions or combination of interventions provide the best outcomes for different subpopulations of offenders.
  - Are there commonalities and differences across interventions that can provide insight into the essential ingredients of effective interventions? This may include an examination of content, delivery mechanisms, training, duration, key features, and the emphasis that is placed on sanctioning, rehabilitation or both.
  - Is there an optimal duration for the various interventions that are available, including educational programs, treatment, probation, and alcohol monitoring technologies?
  - Is it possible to achieve the outcomes associated with longer-term and more intensive treatment interventions using well-designed programs that are more cost-effective and shorter in duration?

- What characteristics of offenders are most useful to appropriately match them to effective interventions?

- With regard to the implementation of interventions, the following issues should be addressed:
  - Increases in female involvement in impaired driving arrests and crashes warrant close monitoring and may have important implications for the delivery of interventions in order to account for differences across sexes and ages.
  - There is growing awareness that additional and complementary services may be required for specific sub-populations of offenders such as those who possess deficits in executive cognitive functioning, those who suffer from co-occurring disorders, and those offenders identified with polysubstance (i.e., alcohol and drugs) use.
  - While much has been learned with regard to effective interventions, less work has been focused on the implementation of such programs to ensure that they are delivered in ways that demonstrate fidelity to the model.

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