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Alcohol ignition interlock schemes: best practice review

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ABSTRACT

Alcohol ignition interlock schemes (AISs) for drink drive offenders can be mandatory or voluntary in nature, although many include both approaches. Outcome evaluations of AISs show that they effectively reduce or eliminate drink drive offending only for as long as an interlock is installed, as once an interlock is removed risks of re-offending tend to return. Achieving a critical mass of interlock use among drivers will increasingly develop a sense of normality about interlocks, with benefits in reducing recidivism among drink drivers as well as contributing to reduced alcohol offences and crashes among drivers generally. Increased use of interlocks can come from greater use among non-offender driver groups such as occupational drivers, inclusion of first offenders as well as repeat offenders in AISs and technological advances in interlock design relating to ease of use and tampering prevention. Other critical operational factors relevant to AIS effectiveness include: the timing of an offender's admission to an AIS, the degree and nature of participant monitoring while on the AIS, the type of any adjunct education, treatment or other support programs, availability of user cost subsidies, how often participants drive illegally while subject to AIS requirements, and AIS interoperability between jurisdictions. Based on AIS evaluation findings, together with relevant theoretical and experiential perspectives, a substantial list of best practice components characteristic of effective AISs has been derived. This list can be used to gauge the potential effectiveness of and identify possible areas for improvement in existing AISs.

KEYWORDS

Alcohol, ignition, interlock, drink drive, repeat offender

Summary

Alcohol ignition interlock schemes (AISs) tend to be of two types. They can be mandatory, with interlock fitment in offenders' vehicles required either as a court order as part of sentencing, or required as a driver licensing administrative directive following a drink driving related licence suspension. There can also be voluntary schemes in which offenders typically elect to serve an interlock term in lieu of partial reduction in licence suspension. Many current AISs contain both approaches in a complementary fashion. However, some northern European countries have expanded their interlock programs beyond application just to offenders, as a standard fitment in vehicle fleets to assure safety and quality risk management in occupational driving contexts.

The consensus across outcome evaluations of AISs is that they effectively reduce or eliminate drink drive offending only for as long as an interlock is installed as, once an interlock is removed, risks of re-offending tend to return. Contemporary interlock literature supports the view that a critical mass of interlock use among drivers will increasingly develop a sense of normality about interlocks, with benefits in reducing recidivism among drink drivers as well as contributing to reduced alcohol offences and crashes among drivers generally.

Increased use of interlocks can come from greater use among non-offender driver groups such as occupational drivers, inclusion of first offenders as well as repeat offenders in AISs and technological advances in interlock design relating to ease of use and tampering prevention.

Other critical operational factors relevant to AIS effectiveness include:

- the timing of an offender's admission to an AIS
- the extent that cost subsidies are available
- the degree and nature of participant monitoring while on the AIS
- the type of any adjunct education, treatment or other support programs
- how often participants drive illegally while subject to AIS requirements, and
- AIS interoperability between jurisdictions.

Based on AIS evaluations, together with relevant theoretical and experiential perspectives, this report concludes with a substantial listing of components characteristic of an effective AIS as identified in the literature. This list can be used to gauge the potential effectiveness of and identify possible areas for improvement in existing AISs.

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1 Introduction

1.1 Alcohol ignition interlocks - Background

An alcohol interlock is a small breath-testing device, about the size of an electric shaver, which can be fitted to a vehicle and is connected to the vehicle's ignition circuit. It measures the driver's breath alcohol level when he/she blows into it, allowing the driver to drive legally while preventing him/her from starting or operating the vehicle after drinking alcohol.

Before starting the vehicle, the driver must hum and blow or inhale and exhale for a few seconds into the interlock device. The device then measures the driver's blood alcohol concentration (BAC). If the driver's BAC is above a pre-set limit (which can be a zero BAC) then the interlock device will not allow the driver to start the vehicle for anywhere between 5-30 minutes. If the vehicle is stopped for more than about 3 minutes, the driver will need to carry out another successful breath test before re-starting.

In addition, the interlock requires the driver to undertake a re-test at random intervals as they drive along. The interlock allows approximately 3 minutes to give the driver time to stop the vehicle and take the breath test. If the driver is still below the pre-set limit, they may continue driving. Where a driver does not present a sample, or they fail a re-test, an alarm or horn and lights will start until the vehicle is turned off, or the driver undertakes a successful re-test.

All interlock use is monitored using an in-built data logger. There are sophisticated features (such as humming a required tone) that make it difficult for an individual to provide a proper breath sample without having been properly trained by a qualified service technician. Each failed attempt to provide a breath sample is recorded and attributed to the program participant. This means that family members who also need to drive the interlock vehicle are also taught how to use the device to avoid any errors they make being inadvertently recorded as made by the interlock program participant.

Interlock users must return their vehicle to the installation facility to have the interlock calibrated and serviced, generally every 1 to 2 months (e.g. around 2 months for offenders proven to be largely compliant, but 1 month for offenders requiring close monitoring). Each time the interlock is serviced, the interlock device is checked to make sure it is operating properly, and the information recorded about the previous month's use is downloaded. The installer also performs a visual inspection of the device and its wiring and the vehicle itself, to make sure that no tampering or circumvention has occurred during the monitoring period.

There is often an important interrelationship between someone's alcohol use, their drink driving incidence and AIS participation (Vanlaar, Robertson & Schaap, 2010). This interdependency, which is recognised in Australia's national road safety strategy, means improvements in managing a broad alcohol problem support greater AIS compliance, and conversely AIS participation brings results in better self-management of both drink driving and general alcohol consumption.

2 Alcohol ignition interlock schemes: best practice review

2.1 Introduction to the review

The first alcohol interlock scheme (AIS) began in California in 1986 and its early success in reducing drink driving led to such schemes being introduced in other American states and Canadian provinces in the 1990s. In the sixteen years since the first scheme, a great deal has been researched about AIS implementation and its road safety effectiveness in the USA and Canada. However, as discussed later, this report is not an exhaustive examination of all relevant published studies.

The review first provides a brief overview of the evolution of AISs. It next looks at recent evaluation studies of AISs, particularly with respect to effects on offence patterns and crashes, as well as operational effectiveness. This information is then used as the basis for identifying best practice components of an effective AIS.

Relevant literature was searched using the Australian Transport Index, TRANSPORT, TRID, CINCH, Australian Federal Police Library, AGIS Plus Text (all via Informit Online), Science Direct and PubMed databases under the search terms: “ignition interlock, drink driving and repeat offender, drink driving and offence, drink driving and penalty”. From this broad sweep, literature relating to AIS outcome and operational effectiveness plus operational issues was selected if it could usefully contribute to building a best practice view. Although significant studies from the 1990s were included, there was a search emphasis on literature since 2000, as both interlock devices and programs have evolved considerably since they first began.

2.2 Evolution of AISs

The original Californian AIS was a mandatory scheme in which State law directed judges sentencing an offender convicted of driving under the influence (DUI) to require installation of an interlock on any vehicle they owned or operated. The AIS also had a discretionary component in which repeat DUI offenders were encouraged to install an interlock after halfway through a term of suspension if they also obtained a restricted licence allowing them to drive with the interlock fitted (DeYoung, 2002).

2.2.1 Mandatory versus voluntary AIS

Jurisdictions that have subsequently adopted an AIS tend to have a mandatory component as the core but many also have a complementary discretionary or voluntary AIS provision. Mathijssen (2006) commented that while participation rates may be higher for mandatory AISs, compliance with AIS conditions tends to be higher in voluntary schemes. However, while participation rates may be higher for mandatory schemes, making an interlock term for offenders as a pre-condition for reinstatement of full licensure does not necessarily increase overall AIS participation rates (Voas et al, 2010). As long as increased participation and acceptance of interlocks is an AIS objective, then this can be better achieved through adopting both mandatory and voluntary forms rather than either one on its own.

Chamberlain and Solomon (2012) teased out some of the complementary pros and cons of mandatory versus voluntary AISs. Participants in voluntary AISs tend to require shorter terms, which can increase their attraction and hence overall AIS participation rates. They also tend to be used for less serious alcohol offences, whereas mandatory schemes are generally reserved for more serious offences involving very high BACs, or where death or injury was involved. In particular, mandatory schemes bring a punitive element through the likely financial impost on the driver, social stigma and inconvenience for both vehicle operation and alcohol purchase (Elder, 2013). However, voluntary schemes may also exclude serious offenders to prevent them from obtaining the ‘reward’ of early

licensure, or they may be reserved for those deemed ineligible for the mandatory AIS on hardship grounds (Chamberlain and Solomon, 2012). Chamberlain and Solomon (2012) advocated that all drink drive offenders should be eligible for an AIS and that the seriousness of an offence should be reflected in the term of imprisonment or other sanctions imposed, rather than by limiting access to the AIS with its treatment components and traffic safety benefits. Indeed, there is current lobbying of American politicians to make interlocks compulsory for all drink drive offenders (Marques & Voas, 2012).

Smith (2004) and Mathijssen (2006) noted that American judges did not always require interlocks to be fitted, despite the legislated requirement for them to do so. These two researchers considered that the judges preferred the opportunity to exercise discretion when they believed a case warranted it, while DeYoung (2002) reported some judges believed interlocks were ineffective. Furthermore, in many instances even if an interlock was ordered by a judge, this order was not necessarily followed through by court officials or the offender, usually because the offender claimed they no longer had a vehicle to drive, that the financial cost was too great (despite the availability of subsidy schemes), or that monitoring the offender's behaviour and enforcing compliance was too problematic.

Robertson, Holmes and Vanlaar (2012) report that common myths about interlocks still persist among the judiciary, which suggests that more information about AIS parameters needs to be conveyed to the court systems in those jurisdictions that allow judges to include an interlock term as part of a sentence. Judicial 'common myths' include that interlocks are easily circumvented and that they are disproportionately unfair for low income offenders.

To overcome judge and court official aversion to sentencing a required interlock term, some jurisdictions instigated AISs in which interlock fitment is achieved through an automatic administrative sanction imposed by a driver licensing or other government authority. This can be in addition to any voluntary participation provision. According to Voas, Blackman, Tippetts and Marques (2002), a key advantage for administrative over court imposed sanctions is that motor vehicle departments usually have greater resources for managing the programs. However, the authorities must rely on participants complying with the administrative sanction merely because this accords them the privilege of driving legally. Voas et al (2002) cite the experience in California, where only 16% of drink drive offenders chose to regain that privilege, even when an interlock was not a requirement for licence re-instatement (although they did not say if this meant the remainder drove illegally or not at all). Marques et al (2010) found that even among a group of offenders with ten-year license suspensions, only 10% voluntarily chose an interlock term in lieu of suspension. Elder (2013) considers this indicates that many offenders consider interlock installation to be a more severe sanction than licence suspension.

By contrast, courts are able to force greater motivation on offenders to install interlocks by their ability to apply severe sanctions, even gaol for non-compliance. This is even though court-imposed interlock regimes can be hampered by ineffective coordination with the licensing authorities tasked with implementing the interlock order and relicensing of offenders (Marques & Voas, 2010).

As well as administrative versus court-imposed, differences between AISs may also be philosophically based. Marques (2009, p. 460) noted that some programs:

...may insist on abstinence and total compliance with an order to no longer drink, whereas others are more centrally focussed on reducing impaired driving and are less concerned about drinking habits that do not endanger the public on the roads.

In this vein, Marques and Voas (2012) note that while an AIS may be intended as a broader therapeutic behaviour change program, this is not necessarily the case in practice. Drink drive offenders may drink alcohol more strategically to avoid interlock lockouts, but this does not automatically mean that they will drink less overall.

AIS success in America and Canada contributed to Sweden in 1999 being the first European country to adopt an AIS. In 2004-2005, France, Norway, Germany, Belgium, Spain and the United Kingdom ran small-scale experimental programs and France and Finland established national AISs in 2009 (SWOV, 2011). The Netherlands followed suit in 2011. An inventory of AISs as reported by licensing authorities in Australia, Europe and North America is available at <http://iiip.tirf.ca/>

Australia's National Road Safety Strategy 2011-2020 broadly recognises the need to make greater use of technological aids such as alcohol interlocks as a component toward achieving road toll reductions over the coming decade. It also recognises that a substantial proportion of drink drivers, recidivists in particular, are not responsive to mainstream deterrence measures due to serious alcohol abuse and broader social problems. The strategy also indicates that, while there is an ongoing need to focus on offenders, there is scope to extend the application of interlocks to other high risk driver groups and broadly among drivers generally as preventative rather than just punitive measures. As first steps, the strategy proposes the following actions:

- a. Extend the application of alcohol interlocks to cover a wider segment of drink driving offenders.
- b. Undertake research on options to extend alcohol interlock applications to other high-risk road user groups and potentially to the broader driver population.
- c. Encourage voluntary use of alcohol interlocks by corporate fleets and other drivers.
- d. Investigate the option of requiring demonstrated rehabilitation from alcohol-dependence before removal of interlock conditions.

At the time of writing, South Australia, Queensland, New South Wales, Tasmania, Victoria and the Northern Territory are the only jurisdictions to have an alcohol ignition interlock system (AIS) operating, although the extent of implementation and structure varies. The Australian Capital Territory aims to introduce an AIS later in 2013. New Zealand's mandatory AIS began in 2012. Interlocks are canvassed in Towards Zero, Western Australia's road safety strategy for 2008-2020. Although no scheme currently operates in that state, a substantial amount of policy work has been done (Hands, 2003), including small-scale feasibility trials conducted in regional and remote Aboriginal communities (Cercarelli & Gavin, 2003), the latest in Roeburn in 2009.

One feature of the South Australian AIS is that, alongside its court and administrative provisions for imposing an interlock, where a driver is deemed by a doctor to be alcohol dependent under fitness to drive provisions, the Registrar of Motor Vehicles, in consideration of the medical advice, can require an interlock condition to be stipulated on the driver's licence. The interlock condition lasts until the person is deemed to be no longer alcohol dependent, and this is irrespective of whether a drink drive offence has been committed before or during the interlock condition. A similar but more streamlined provision operates in Finland as doctors there can now directly recommend to the authorities that an interlock be installed (Robertson, Holmes and Vanlaar, 2012).

2.2.2 Broader applications of AISs

Until recently, AISs have been primarily viewed by governments as offender sanctions aimed at reducing the incidence of drink driving offences and crashes, at least while the interlock is fitted. However, as foreshadowed in the National Road Safety Strategy, there is now a growing trend for interlocks to be also viewed as aids to alcohol rehabilitation in the broader context of an offender's lifestyle (Schonfeld & Sheehan, 2004; Vanlaar et al, 2010) and not just in relation to a drink driving problem. It is worth noting that a survey of all 2008-2012 participants in the Finnish AIS reported that one third said they have kept, or will keep, their interlock in their vehicle once their mandatory period has passed (Löytty, 2013). A more holistic view of the purpose of interlocks contributes to broadening

the general acceptance of interlocks as a regular driver management measure, which in turn can offset varied disincentives for interlock use, such as their inconvenience, cost and social stigma, as noted by Hands (2003) and Chamberlain and Solomon (2012).

In addition, interlocks are now being viewed as quality assurance measures, as well as preventative measures in occupational health and safety contexts whereby some companies and authorities require drivers of buses (including school buses), taxis and trucks, to use their vehicle's fitted interlock before they begin their work shift (ETSC, 2005; Robertson et al, 2009, 2011). The Volvo Car Corporation has been involved in discussions about including its integrated Alcotest interlock as a standard manufacturing feature for new cars (Volvo News, 2012) and Saab Automobile is also endorsing this direction for the vehicles it manufactures (Magnusson et al, 2011). Transport Canada commissioned a report that recommended conducting feasibility studies on requiring all new vehicles sold in Canada to be fitted with interlocks (Robertson et al, 2011). In Australia, a cost benefit analysis (Lahausse & Fildes, 2009) suggests that requiring all new vehicles to be fitted with interlocks could reduce national road fatalities by 24% and serious injuries by 11%.

This evolving wider cultural change concerning the use of interlocks in vehicles is an influential broader contextual issue, because one of the keys to the success of an AIS for offenders is the degree to which interlocks become viewed and used in a universal and more positive context (Marques, 2009). Two international conference workshop sessions on developing public policy on interlocks (Robertson et al, 2010), for example, suggested there is value in interlocks becoming a standard vehicle safety feature, much like seatbelts, which would help broaden their acceptability. In America, at least, the majority of the population is receptive to the notion of all vehicles having alcohol detection devices in order to prevent drink driving (McCartt et al, 2010). In fact, as Marques (2009) and Marques et al (2003) pointed out, it would be helpful if AISs were more generally accepted as public protection measures against high risk drivers, rather than as forms of criminal retribution or as rewards for contrite offenders.

Grill and Fahlquist (2012) point out that technological advances in interlock design are helping to make the devices more amenable for general usage when fitted as a standard feature in vehicles. For example, non-offenders only need the device to prevent a vehicle from starting, they do not need regular data monitoring. Such simplified usage reduces the need for regular servicing, in turn reducing overall operational cost. The need for breath samples can be avoided if advanced touchpad sensors are used, in turn making the rolling retest procedure a far simpler and safer task. Grill and Fahlquist (2012) went on to identify two sources of moral objection to more widespread interlock use: that they take responsibility away from individual drivers and they are a form of paternalism. However, they provide detailed but persuasive arguments to dismiss these objections on public safety and cost efficiency grounds.

2.3 AIS outcome effectiveness

This literature review focussed on AIS evaluations performed since 2002 rather than earlier ones because interlock devices used in AISs have evolved considerably from the very first models requiring the driver to perform a perceptual or motor task designed to detect driver impairment. These were largely incapable of discriminating between low and moderate intoxication levels (Vanlaar et al, 2010) and were relatively easy targets for circumvention by offenders (Voas et al, 2002). They have evolved to sophisticated second and third generation devices requiring the driver to hum and blow, or inhale and exhale, into the device so that opportunities for circumvention are minimised, thus securing greater compliance with AIS conditions (Smith, 2004; ETSC, 2005; Elder et al, 2011). In turn, this results in improved effectiveness in reducing the incidence of drink driving among offenders (Clayton & Beirness, 2008). Another rationale for this selectivity is that the early evaluation studies often

suffered from weak research designs, small sample sizes among voluntary participants and relatively shorter participation durations for collection of usage data (Schonfeld & Sheehan, 2004). This is notwithstanding that the early results nevertheless tended to recommend AIS continuation and expansion on the basis of recidivism reductions found. A critical mass of AIS participants is also needed, not only to afford sufficient statistical power in evaluation studies, but to make a substantial impact on drink drive recidivism generally within a jurisdiction.

With regards to participant self-referral in evaluation studies of AISs, whether offender participation in the AIS is voluntary or mandatory can render making comparisons between study samples problematic. This difficulty is compounded when voluntary AIS participation becomes mandatory in effect because an alternative sanction (such as longer licence suspension periods, jail terms or vehicle impoundment) makes it an attractive option to prefer the AIS (Voas et al, 2002; Hands, 2003; Smith, 2004). At the other extreme, participants in the schemes, whether voluntary or mandatory, might claim they are not subject to the program because they have sold their vehicle or otherwise have no vehicle available for interlock installation (Voas et al, 2002; Elder et al, 2011). Such drivers may also make no attempt to regain their licence, perhaps driving unlicensed instead (Smith, 2004). These possibilities can likewise bias a study sample, as well as reduce the sample size.

A common characteristic found in the literature is that any positive effects in reducing drink driving among the participants tend to last only while the offender is required to have an interlock fitted. This trend has been apparent in both early and more recent evaluations. Despite this major limitation in long term effectiveness, major evaluation studies have reported reductions in recidivism ranging between 35% and 90%, with an average reduction of 64% while the interlock is fitted (Willis et al, 2004).

2.3.1 Effectiveness of US and Canadian AISs

In Alberta, Canada, the driving records of first time drink drive offenders participating in an AIS for 6 months and repeat offenders for 2 years on an AIS were compared with similar offenders not participating in an AIS (Voas et al, 1999). Offenders who had interlocks installed had substantially reduced recidivism rates compared with non-participants during the interlock period, but this difference disappeared once the interlock was removed. However, because only 8.9% of eligible drivers elected to participate in the AIS, the researchers found only a 5.9% reduction in the drink drive recidivism rate for Alberta as a whole. A year later, the research team reported again on the Alberta study, noting other potential variables such as AIS participant access to non-interlock vehicles during the program and access to the interlock vehicle by other family members. However, they had no evidence to suggest that these variables were influential in the Alberta study, although this may not have been the case for mandatory participants (Voas et al, 2000). Nonetheless, a further evaluation by Beirness et al (2003) of the Alberta AIS found that mandatory participation can be just as effective as voluntary participation when offenders are matched on key variables.

In Maryland USA, 1387 recidivist drink drivers were randomly assigned to participate in either an experimental group trialling an AIS or a control group in the customary drink driver treatment program (Beck et al, 1999). The customary approach involved a licence restriction allowing offenders to drive only if they are alcohol free, plus participation in Maryland's Drinking Driving Monitoring Program involving supervision by a probation officer trained in alcohol and drug addiction treatment.

Offenders participating in the AIS had their pre-program risk of committing a drink drive offence reduced by 65% during the first year on the program. During that first year, AIS participant offence rates were significantly less than those of the control group. However, there was no statistically significant difference between these groups after the interlock licence restriction was lifted. While

random assignment of subjects was clearly a major strength of the research design, this randomness was compromised by half of the interlock group choosing to not install the devices, leading to only the most motivated drivers using the interlocks (Raub et al, 2003). The motivated drivers were likely to have been those who were more concerned about maintaining their legal driving status and less willing to drive without a valid licence, whereas the unmotivated ones may have been less willing to change their driving habits (ibid).

Other early major studies showing AIS effectiveness in reducing drink driving offences only while interlocks are installed include those conducted in Colorado (Marine, 2001), Quebec (Vézina, 2002), Pennsylvania (Corben & Larkin, 1999) and West Virginia (Tippetts & Voas, 1998).

In 2003, Raub, Lucke and Wark compared two groups of Illinois drink drive offenders, one required to install interlocks, the other not. It was found drivers with interlocks were one-fifth as likely to be arrested for drink driving than the comparison group during the one year term of the interlock fitting. Once the interlock was removed, this ratio continued for up to one year, with the two groups reverting to similar proportions 3 years after interlock removal (this was 2.0% of the interlock group re-offending compared to 1.7% of the control group re-offending in the last 6 months of the 3 year post-interlock period). The researchers considered that because they found interlocks poor at generating long-term behaviour change, they recommended interlocks should remain installed either as a permanent licence condition or at least until drivers can demonstrate alcohol-free driving well beyond the original interlock term imposed. Also noted was that approximately 84% of drivers eligible for interlock installation actually had them installed, thereby limiting the effectiveness of the whole AIS. Reasons for not installing interlocks include the cost of fitment as well as increased insurance premiums imposed by companies that consider interlock drivers to be at greater risk.

A recent evaluation of Saskatchewan's voluntary AIS (Roberston et al, 2011) followed 681 offenders during 2002-2003 for up to three years after the interlock was removed, compared with a control group of 2796 offenders not installing an interlock. For the time between conviction and interlock removal, recidivism rates for the interlock group were 81% lower than the comparison group and 21% lower up to 3 years after interlock removal. A recent evaluation of the ten year old AIS in Florida found a comparable 80% reduction in recidivism over 2 years compared to offenders who only received a licence suspension (Chamberlain & Solomon, 2012; see also Voas, Tippetts & Grosz, 2013a).

In 2004, DeYoung, Tashima and Masten conducted an evaluation of California's AIS that showed it worked "for some offenders in some contexts, but not for all offenders in all situations" (p. 15). In other words an AIS should not be viewed as a complete panacea for eliminating drink drive recidivism. While California's AIS was generally effective in subsequently reducing drink drive recidivism while the device was installed, it was considered the areas in which there was ineffectiveness were due more to the way the program was structured and administered than to factors associated with the nature of the interlock device and its operation. These relevant structural and administrative factors included judges' unwillingness to order interlock fitting, reluctance of offenders to install the device even when ordered to, and offenders who drove in contravention of the AIS requirements (ibid).

Nonetheless, the study did show that offenders who installed an interlock had higher crash rates than offenders not involved in the program; this is despite AIS participants reducing their drink drive recidivism rates. The researchers speculated this higher crash rate may be due to offenders with interlocks driving more and thus having more exposure than drivers not installing interlocks. Similar findings were reported by Vezina (2002, cited in Ferguson, 2012). Drivers without interlocks remained on suspended licences and if they drove unlicensed in that time were perhaps likely to have driven more carefully or cautiously to avoid detection.

DeYoung et al's (2004) evaluation also found that one group for whom interlocks appeared to have little effect is first time offenders with high blood alcohol levels (average BAC 0.20%) who were required to install an interlock. These offenders had the same risk of subsequent crash and drink drive convictions as first offenders not required to install an interlock. However, the study found that second time offenders volunteering to install an interlock (so that they could receive a restricted driving licence) had a significantly lower risk of repeat drink driving (but higher crash risk) than second offenders who remained suspended. Overall, both mandatory and voluntary AISs were effective in reducing drink driving at least for the duration of interlock installation, but the effects on crash rates were mixed.

Even if interlocks may not be an effective measure for first time offenders with high BACs, there is evidence at least that they are effective for first offenders with low to moderate BACs (Bernhoft, 2003). In addition, McCartt, Leaf, Farmer and Eichelberger (2012) evaluated two 2004 law changes relating to Washington State's AIS. One law change was to transfer issuance of interlocks from courts to the driver licensing agency. The other was to require interlocks for all first offenders with BACs lower than 0.15. It was estimated that introducing this requirement reduced recidivism among this group by 12% within 2 years of conviction and contributed to overall reductions in single vehicle night time crashes in Washington State by 4.8%.

2.3.2 Effectiveness of Sweden's AIS

Following a positive evaluation of its trial AIS (Bjerre, 2002), Sweden expanded that program nationally. In 2008, Bjerre and Thorsson evaluated the expanded AIS, again by comparing interlock drivers with two control groups. The interlock group were 1266 drivers who voluntarily selected a two-year interlock term in lieu of a year's licence suspension. One control consisted of 865 suspended drink drivers who had no opportunity to participate in an interlock program while the other control group were 8094 suspended drivers who refused AIS participation. However, a key feature in this study was that in Sweden AIS participants are required to have a medical examination every three months involving blood and urine samples to check for indicators of alcohol consumption. Moreover, in the second year on the AIS, participants must present test results that do not indicate raised alcohol consumption, as a pre-condition to return of full licence status. If raised alcohol levels are found at any time, the participant is precluded from continuing with the AIS.

The study found that after AIS completion, there was a significantly higher proportion of offenders in the interlock group who had successfully regained their licences. This is despite the required medical standards being stricter for the AIS group. The AIS group also reported a 60% reduction in drink drive recidivism and 80% fewer crashes up to 4.6 years (average 2.3 years) after the program, compared to before. These were lasting effects rarely found in the previous evaluation studies reviewed here. A repeat evaluation in 2005 by Bjerre not only again demonstrated reduced recidivism and drink drive crashes among the offender participants, but found interlocks voluntarily installed in commercial vehicle fleets were effective in preventing these vehicles from being driven by alcohol affected employees.

Magnusson et al (2011) reviewed Sweden's AIS over the previous ten years and reported less recidivism, reduced crashes, reduced hospital treatment, reduced sick days, and reduced alcohol consumption, going on to conclude that, "...from a socio-economic perspective, interlocks are effective" (p. 379). Also noted was that Sweden is implementing a separately tailored mandatory 2 year AIS for high risk drink drive offenders alongside a voluntary 1 year AIS for first offenders and those with low BACs, in lieu of a longer licence suspension. Inducements for the new voluntary program include removal of the administration fee for participants, reduced number of medical checks, less frequent interlock servicing schedules and easier full licence reinstatement. However, those who

flout the AIS requirements face stricter rules and longer interlock terms (Robertson, Holmes and Vanlaar, 2012).

2.3.3 Evaluations of Australian AISs

Queensland appears to be the only Australian jurisdiction to have conducted an outcome (road safety impact) evaluation. In 2006, Sheehan, Schonfeld, Watson, King, Siskind and Freeman reported on an interlock trial in that State that was an extension of an existing drink drive rehabilitation program, Under the Limit. Despite relatively low participation (n=29), Sheehan et al found that, compared with a control group of offenders, the AIS participants had fewer incidents of drink driving during the 2 years after the program. Importantly, the study also demonstrated that the positive effects of the Queensland AIS in reducing recidivism were not simply due to legal sanctions alone, such as suspension and use of the interlock, but through combining the effects of these with educational and counselling interventions (Robertson et al, 2010; see also Freeman & Liossis, 2002b).

Other papers have been written on the Queensland trial by Freeman and Liossis (2002a) and Freeman et al (2003). Due to the very small sample sizes in these two studies, the researchers focussed on identifying problems associated with conducting outcome research in this area, in addition to discussing issues of operational effectiveness.

2.3.4 Meta-analyses of AIS evaluation studies

Many of the above reviewed evaluations and others since 1992 were the subject of a meta-analysis by the prestigious Cochrane Collaboration (Willis et al, 2009). In this case, these authors selected controlled studies in which offenders had been charged with drink driving and were either sentenced to AIS participation or the regular sanction (e.g. licence suspension). One randomised control study (Beck et al, 1999), ten controlled studies (including Voas et al, 1999; Marine, 2001; Vézina, 2002; Raub et al, 2003) and three on-going trials at that time (Sweden, Queensland and Victoria) were identified. Overall, Willis et al concluded that AISs effectively curb drink driving while interlocks are installed, but that the long term effectiveness is questionable, largely due to the paucity of randomised control studies and research weaknesses in general. A key issue identified was the low participation rate of voluntary schemes in particular.

In a criticism of Willis et al (2009)'s exacting selection criteria, Marques (2009), rightly pointed out that AIS participation is determined by judicial or administrative offer rather than the random assignment to treatment and control groups preferred by Cochrane.

Although not strictly a meta-analysis, Marques (2009) also provided a useful summary of the results of 13 different AIS evaluations within a general account of the use of interlocks and issues related to their use. With respect to efficacy in particular, Marques reported that the 13 studies generally concluded that interlocks are mostly effective in controlling drink driving while installed but that greater confidence in their effectiveness will only come from AIS evaluations where there has been a much greater uptake of interlocks by offenders.

A more recent meta-analysis was conducted by Elder, Voas, Beirness, Shults, Sleet, Nichols and Compton in 2011. Elder's team selected evaluations for review essentially on their extent of coverage of issues deemed by Elder et al to be salient to the particular topic, in this case, AISs. Although Elder et al acknowledged the 2004 Cochrane Collaboration review, it did not attempt to replicate it so much as to identify gaps in available information about AISs, with a view to providing a useful community guide to identifying what makes AISs effective.

Nonetheless, like Cochrane, Elder et al's overall conclusion was also that interlocks are effective in reducing drink driving while they are installed, but that there is a lack of persistent benefit once the interlock is removed. In consideration of this, Ferguson (2012) concludes that there is little evidence of a specific deterrent effect for interlocks, or of a general deterrent effect of AISs on would-be drink drivers. Elder et al (2011) also noted that the potential for AISs to reduce drink driving and related crashes is limited by the common trend for relatively small numbers of drivers willing to install interlocks, and that more widespread and sustained take-up of interlocks could have a substantial impact on alcohol-related crashes.

2.3.5 Overall AIS outcome effectiveness

Commonly among AIS evaluations, interlocks have been shown to be effective measures in reducing drink drive recidivism and associated crashes. This is despite AIS evaluations suffering from a range of methodological problems, particularly relatively small sample sizes due to low participation rates. A critical mass of AIS participants is needed, not only to afford sufficient statistical power in evaluation studies, but also to make a substantial impact on drink drive recidivism generally within a jurisdiction.

Many evaluation studies reveal AISs are effective only for as long as the interlock is installed, with the researchers often concluding that the interlocks should remain installed until substantial periods of alcohol-free driving can be demonstrated by the offender. In fact, for the deep seated minority of repeat offenders (often those with high BACs) who appear immune to modifying their behaviour through a required interlock period, an indefinite compulsory interlock fitting may be the only way they can maintain their driving privileges.

Marques (2009) notes that this recalcitrant minority is not really indicative of any inherent ineffectiveness of AISs. Rather, it is indicative of the difficulty in long term behaviour change for this group, who essentially comprise the alcohol dependent. In this regard, Marques advises that broader based (holistic) treatment for alcohol dependence will improve AIS success if those treatment plans are integrated with the interlock data record to promptly detect and deal with lapses in alcohol control or abstinence. This insightful comment is a useful example of the interrelationship that can exist between a drinking problem per se and the use of an interlock for a drink driving problem. While use of an interlock can be a valuable tool to assist a drink drive offender control a broader alcohol problem, equally, a broad-based focus on a drinking problem can be supportive of efforts to prevent drink driving through use of an interlock.

A summary of further AIS outcome research findings can be found at: <http://aic.tirf.ca>

2.4 AIS operational effectiveness

2.4.1 Introduction

While many of the above outcome evaluations contain commentary about operational effectiveness, there have been some review studies exclusively focussing on operational effectiveness. This is largely the case with Australian AISs due to those schemes' relative infancy and hence insufficient time for offence and crash data to accumulate in meaningful quantities in order to satisfactorily conduct outcome evaluations.

In 2004, Schonfeld and Sheehan provided the first national overview of the evolution of Australian AISs. Their overview began with an account of why AIS implementation in Australia lagged behind that of the US and Canada, due to factors such as the difficulties experienced by the early evaluators of AISs, concerns about tampering and circumvention, cost to participants and official reluctance to amend existing loss of licence provisions. Next, they discussed early Australian pilot programs and

trials, including the difficulties surrounding AIS administration in remote areas of the country. The paper then goes on to briefly discuss alternative structures for AISs, whether they should be mandatory or voluntary, administrative or judicial, and then examines in some detail attendant issues of length of licence disqualification, cost, recruitment, and management of the offender's broader alcohol problem. The paper concludes with some early results from an evaluation of the Queensland AIS.

A more recent overview of issues experienced in Australian AISs is provided by Robertson et al (2010). Common issues identified included:

- overcoming concerns about interlock tampering and circumvention
- how to improve participation rates
- improving communication and coordination between the operational agencies involved
- interstate mobility for AIS participants who move and travel interstate
- whether Australian AISs should include a treatment program.

More specifically, concerns about ease of tampering were overcome through field trial demonstrations in South Australia and Victoria. Concerns about rural and remote area AIS participants accessing interlock installation and servicing centres were tackled in Victoria by not requiring offenders to drive more than 150 km to such centres and in NSW by increasing the number of installers in that State. Interestingly and coincidentally, Clayton and Beirness (2008) briefly discuss North America's experience with employing mobile units to service the interlock needs of rural participants.

The value of a treatment component in helping AISs achieve their objectives is well accepted. However, this is often difficult to achieve operationally due to issues such as ensuring participant compliance with the treatment regime (which is commonly due to impaired thinking stemming from an individual's alcohol problem), as well as problems of access by rural/remote offenders as just discussed.

A six-month operational trial of 25 interlocks fitted to volunteers' vehicles was conducted in South Australia's Riverland in 1998. Reports of the trial (Coxon, 1998; Coxon & Earl, 1998) generally found that the program was well accepted by the participants, and that there were few operational problems (such as warm-up times). The study did recommend appointment of a counsellor for participants with drink driving records, as well as noting the challenges posed by less than willing participants in any mandatory AIS.

In 2003, Woolley, Edwards and Versteegh evaluated South Australia's voluntary AIS after it had been operating for 2 years. Interviews were conducted with key staff within Transport SA (that government agency's name at the time), the Court system and the Drug and Alcohol Services' Driver Assessment Clinic. There were also 70 drink drive offenders interviewed by telephone, comprising both AIS participants and non-participants. Also, a court session was attended, to clarify and understand how the AIS was promoted and the processes involved in sentencing drivers. Woolley et al's (2003, p. 34) overall conclusions included:

- The cost for most individuals was too high [this is despite subsidy assistance availability; costs included court fees, interlock installation and ongoing costs].
- The scheme was perceived as being unnecessarily complex and the implications of joining were not well understood.
- There was no provision to allow potential participants to give the scheme a trial.

- It was more attractive in most cases to endure the full suspended licence term or perhaps drive unlicensed.
- For participating individuals, the benefits included achieving mobility to maintain an income, satisfying family responsibilities and receiving feedback on drinking behaviour.
- Virtually all AIS participants had unexpected initial difficulties with their interlock and the rolling retest caused considerable anxiety when driving in heavy traffic [also experienced in California (DeYoung, 2002)].
- A third of the assessment clinic clients returned for voluntary education and counselling sessions beyond the minimum required and most AIS participants felt counselling was appropriate for those with alcohol problems.
- Offender compliance with the AIS was deemed high, based on anecdotal evidence, but this was not able to be confirmed through data downloads from the interlocks.

Woolley et al (2003) concluded with sixteen recommendations, including:

- The Department should ensure information about the AIS is adequately promoted, especially in rural areas, in the Court system and among lawyers.
- The Department should make it clear how data gathered on AIS participants is used for monitoring, especially in relation to non-compliance.
- Data exchange between the Drugs and Alcohol Services Council (DASC) and the Department should be improved and studied with a view to better targeting of potential AIS participants.
- The costs of the scheme to users should be reviewed to see if they can be reduced, as well the efficacy of the subsidy scheme should be improved and the subsidies promoted better.
- The Department should investigate options for allowing potential participants to trial the scheme before committing themselves.
- The Department should ensure adequate resources are allocated for AIS administration.

The following are some key operational issues especially relevant to mandatory AISs.

2.4.2 Timing of an offender's admission to an AIS

Clayton and Beirness (2008) note the experience of New Mexico, where offenders are allowed to enter the AIS as soon as they are first arrested rather than serving a term of disqualification first. Evaluations of this scheme showed that the recidivism reductions experienced were similar to those found in comparable studies (Roth et al, 2007b; Marques et al, 2010).

As repeat drink driving offence rates are lower among AIS participants than those who simply serve a disqualification period, there is now a trend in many US states to replace most if not all licence disqualifications by participation in an AIS, beginning as soon as possible. This is premised on reducing the hardship imposed on personal transport by a licence disqualification, by the need to reduce the likelihood of the offender subsequently driving while suspended, and to minimise their drinking of alcohol as well as drink driving. Chamberlain and Solomon (2012) noted evidence that offenders are less likely to participate in an AIS if it is preceded by a lengthy period of licence suspension. As early admittance to an AIS provides an incentive to get a licence reinstated, this will also lead to boosted overall AIS participation rates, in turn leading to overall traffic safety benefits in the form of fewer offenders returning to drink driving. The desirability of early admittance to an AIS was also noted by Schonfeld and Sheehan (2004) and by Hands (2003).

Robertson and Vanlaar (2009), as well as Chamberlain and Solomon (2012), note that jurisdictions contemplating establishing an AIS may be reluctant to dispense with existing requirements for a minimum term of licence disqualification to be first served by offenders, compared with installation of an interlock as soon as practicable. Such existing provisions are usually long standing and are traditionally viewed as sending a strong deterrent message. In fact, longer suspension terms are often sought as a response to increased drink driving incidence (Marques, 2009; Elder, 2013). While disqualification remains an effective sanction for drink drivers, research has repeatedly demonstrated that AIS participation can be considerably more effective than disqualification alone (ibid). This is over and above the benefit of early use of interlocks in minimising the incentive to drive while disqualified.

2.4.3 First offenders or repeat offenders

Elder et al (2011, p. 371) stated:

Typically, interlock programs have been targeted to repeat and high BAC [blood alcohol concentration] offenders. However, first time DWI [driving while impaired in USA] offenders more closely resemble repeat offenders than they do non-offenders, and the results of this review suggest that interlocks are as effective with first-time DWI offenders as they are with repeat offenders. Thus, it would likely be a major boost to overall public safety to require first-time DWI offenders to participate in an interlock program.

The value in targeting first time as well as repeat offenders was also noted by Roth et al (2007a), Robertson et al (2009), Ferguson (2012) and also Chamberlain and Solomon (2012) as having strong evidential support in comparative studies. In addition, American research indicates many first time drink drive offender characteristics resemble those of multiple offenders (Ferguson, 2012), and first offenders can drink and drive more than 200 times before being detected and apprehended (Beck et al, 1999). So, from those perspectives alone, it makes sense to also target first offenders with an AIS. Also, many first offenders frequently drive with high BACs that are more than twice the legal limit and have a significant risk of crashing (Rauch 2005 in Robertson et al, 2009). In addition, recidivism risk is often highest in the period immediately following initial arrest (Marques & Voas, 2012). Up to 69% of respondents in a major US national health survey support interlocks for all drink drive offenders, including first offenders (Shults & Bergen, 2013).

However, Robertson et al (2009) note that inclusion of first offenders in an AIS can be contentious. First offenders can contribute to low participation rates in AISs and debate has centred on focussing most attention on hard core offenders, who have a much greater risk of crashing.

2.4.4 Cost subsidies for AIS participants

Robertson and Vanlaar (2009) discuss various forms of subsidy schemes. For example, offenders might be asked to pay higher AIS participation fees and costs in order to subsidise financially challenged applicants (although this would likely be considered inequitable by participants). Other jurisdictions, such as New Mexico, have established an indigent fund, supported by the government and interlock vendors (ibid). Florida Courts are entitled to waive or reduce fines to help the offender pay interlock costs. However, Hands (2003) cautions that fines should not be waived (or reduced) for AIS participants until successful completion of the interlock program, in order to maximise compliance with it. Still other jurisdictions have negotiated with suppliers for reduced rates for indigent offenders, or for the supplier to agree to free monitoring of one offender out of a given number of paying offenders.

Even without a subsidy scheme, many AIS programs point out to participants that the average daily cost of the scheme is very low, comparable to the cost of a standard drink of alcohol or two (Marques, 2009).

2.4.5 Ongoing monitoring while on an AIS

It has been demonstrated that close monitoring of AIS participants substantially enhances compliance with AIS conditions over time, when compared with less stringent AIS monitoring programs (Zador et al, 2011). Moreover, offenders with the highest BACs detected while participating in an AIS tend to have the highest rates of post-interlock recidivism (Chamberlain & Solomon, 2012). AIS participants generally need to know that their behaviour is tracked via the interlock device. Periodic servicing allows participants opportunities to discuss any issues experienced and ask questions from the agent. Authorities are often replacing fixed-term AISs with open-end date schemes for offenders who show a “clean record” for several months before being allowed to apply for an unrestricted licence (Clayton & Beirness, 2008).

Participants should come to expect that a record of violations will likely lead to an extension in their interlock term or additional sanctions if warranted. It is generally accepted that some leniency is exerted initially, to allow the participant to become acquainted with the interlock and some unintentional violations (such as not performing the rolling retest in sufficient time) are to be expected in the early phase, which serve as an illustration for the offender that the vehicle cannot be driven by someone who has been drinking alcohol. Equally, though, such early violations may also be due to deliberate attempts to “test” the system to see if violations will incur any consequences (Vanlaar et al, 2010). Nonetheless, a record of high BAC violations (particularly early morning violations) is associated with increased chances of recidivism and should be handled by increased monitoring and/or referral to a support program (Clayton & Beirness, 2008; Marques, 2009; Vanlaar et al, 2010; Chamberlain & Solomon, 2012). Conversely, Marques and Voas (2010) note that if a downloaded data log shows that an AIS participant is recording fewer or no breath tests, this may imply the offender is circumventing the AIS by driving a non-interlock equipped vehicle. For such instances, Chamberlain and Solomon (2012) also caution that interlock data revealing fewer breath tests should not be mistakenly viewed as the driver becoming ‘violation free’ and hence eligible for full licensure.

Marques et al (2010) stress the importance of diligent monitoring of downloaded data from interlocks to evaluate ongoing drink driving incidence from the breath test records. In a similar vein, Vanlaar et al (2010) point out the need for AISs to employ sufficient staff to analyse and act on the downloaded monitoring data because the success of an AIS is predicated on an offender knowing that their behaviour is being monitored constantly and that violations will be swiftly followed up. If this intensive monitoring does not occur, an offender may be prematurely removed from the AIS for non-compliance before they have had a chance to learn the consequences of violations and modify their behaviour accordingly. Similarly, towards the end of the interlock term, there should be a substantial period of no violations prior to regaining a full licence and if not a decision can be made about extending the interlock term or removal from the program if necessary. Experience with AISs has shown that there will typically be a small group of recalcitrant re-offenders, regardless of how long they participate in the program (ibid). Consequently, adequate staff resources are needed to identify these cases and to ensure mandatory consequences are applied (for example, permanent interlock licence conditions).

An alternative option to increasing human resources for ensuring intensive monitoring of participants is to use fully automated data recording systems. This is particularly advantageous if an increase in participation rates is anticipated, such as when expanding eligibility criteria to include first drink drive offenders (Robertson, Holmes & Vanlaar (2013). Failure to automate and continued reliance on paper-based reporting systems can lead to offenders ‘slipping through’ gaps in the system or being overlooked as a result of lack of staff, weak communication channels, and untimely exchange of information between various agencies (ibid). Löytty (2013) comments that downloaded data should be in a uniform format across all interlock providers in the AIS.

In some AISs, regular monitoring of interlock data is combined with a more holistic assessment of the offender, including medical assessment. In Sweden's AIS, for example, as part of the support program focussing on lifestyle changes and drinking behaviour, blood samples are required on a regular basis for over 2 years, to determine the extent of alcohol dependency (Marques, 2009). The advantages of such mandatory assessment include (Robertson et al 2011):

- The ability to discriminate between high and low risk offenders and hence tailor interlock terms and conditions to suit the individual (see also Freeman & Liossis 2002b; Robertson & Vanlaar, 2009)
- Use of a standardised assessment protocol affords quality control jurisdiction-wide
- A multi-dimensional form of assessment draws on several sources of objective data to enable an informed risk profile of the offender.

However, the disadvantages should also be borne in mind:

- The potential for false positives and false negatives in assessment results
- Standardised assessments can be influenced by training of the assessor, accuracy when interpreting the results and honesty of the offender (e.g. in relation to impaired driving episodes (ibid))
- Mandatory assessment requirements may deter some offenders from participating in a [voluntary] AIS (Robertson & Vanlaar, 2009).

Technological advances in alcohol monitoring that could be included in an AIS, depending on the degree of surveillance required of an offender include transdermal alcohol detection involving continuous wearing of transdermal detectors locked on to ankles, and infrared spectroscopy of the skin in touchpad sensors that can detect alcohol excreted in perspiration (Grill & Fahlquist, 2012; Robertson & Vanlaar, 2012). It is also possible for interlock systems to contain cameras and/or to require photo identification of the participant prior to breath testing (Marques & Voas, 2012). Such advances are perhaps heralding a fourth generation in interlock systems. However, Robertson, Holmes and Vanlaar (2012) caution that as the systems become more automated, aspects requiring further consideration include ensuring data security and developing back-up systems for saving data.

Finally, Robertson and Vanlaar (2009) suggested there is value in using a formal assessment process in determining when an interlock should be removed in order to regain a driver's licence. In Victoria, for example, such drivers must appear before a magistrate who considers all the evidence from the assessment(s) and ongoing monitoring from the interlock device.

2.4.6 Education/treatment support programs

Adjunct programs to AISs vary in aim, intensity, frequency and duration; ranging from relatively few and brief sessions to multifaceted programs conducted over weeks and months (Ferguson, 2012). Furthermore, programs range from education on how alcohol impairs driving to covering the range of drink driving and lifestyle issues experienced by different offenders. They also vary with respect to the extent they include supervision and monitoring.

There is some evidence in favour of education or treatment programs in combination with AIS participation, though the above diversity should be borne in mind. Clayton and Beirness (2008) note the Texan AIS experience in trialling a 12 hour motivational support program involving individual and group sessions over a 4-month period. Comparisons with a non-support program offender group showed that the program participants had fewer elevated breath tests on the interlock record, which was predictive of a lower likelihood of recidivism once the interlock is removed. The Interlock

Enhancement Counselling (IEC) program is now well-established in Texas and contains components of motivational interviewing, cognitive behavioural treatment and harm reduction. More specific details of the IEC's content and operation are provided by Robertson, Holmes and Vanlaar (2012). Other AIS evaluations show that court-imposed licence suspensions combined with treatment programs (not necessarily as part of an AIS) are superior in addressing drink drive recidivism compared to licence suspension alone (Ferguson, 2012). Ongoing rather than one-off or occasional counselling, as well as rehabilitation, is strongly advised by Beirness et al (2008). In addition, Robertson and Vanlaar (2009) note that follow-up training on use of the interlock should be available to offenders in addition to the initial training.

One of the main benefits of comprehensive support programs is that, in combination with (or as part of) an AIS, they afford a more holistic approach to tackling not just an offender's drink driving problem but beyond, covering the broader context of their lifestyle alcohol management. Voas (2010), for example, has advocated consideration of home-based self-monitoring and recording of BAC levels, to provide definitive feedback to individuals, though home-based monitoring could equally be a mandatory component of a judicial or administrative sanction. Robertson, Holmes and Vanlaar (2012) take this a step further by recommending the tailoring of support programs based on risk assessments of the chances of an AIS participant reoffending. In particular, they note that intensive support directed at low-risk offenders is not only a waste of resources but there is evidence it may also be counterproductive. Fiedler, Brittle and Stafford (2012) note the experience of Colorado and Florida in individual tailoring of various support interventions, based on downloaded interlock use data. Individual tailoring of interlock programs was also a recommendation from France's first evaluation of its AIS (Assailly & Cestac, 2013).

If participants are required to pay for support programs, their cost can be a major disincentive to enrolment (Marques, 2009), which suggests there may be a role for government in paying for, or at least subsidising, the support programs. There may also be an accompanying belief that the risk of detection is low if participants drive while disqualified rather than their required attendance in the program (ibid). Furthermore, there may be a fear that other dependencies (e.g. illicit drugs) might become disclosed during such a program (Tippetts & Voas, 1998).

Comprehensive training support for personnel involved in administering or delivering AISs, as well as interlock service providers, is available on line at <http://aic.tirf.ca>. This Alcohol Interlock Curriculum for Practitioner website is a popular one, with the training resource regularly accessed by practitioners in over a dozen countries.

2.4.7 Driving while suspended/disqualified/never licensed

A major barrier to effective AIS implementation is that an offender may simply drive a vehicle that does not have an interlock fitted, irrespective of whether they are affected by alcohol at the time or not. Of course, this can occur not just with AIS participants, but also offenders disinclined to participate in an AIS. An AIS participant who drives a vehicle without an interlock fitted is driving in breach of a licence condition to only drive interlock-fitted vehicles. Consequently, such drivers are considered to be driving while suspended or disqualified.

Although not often mentioned in the literature, the level of police enforcement of drink driving laws can strongly influence participation rates in mandatory AISs (Mathijssen, 2006). Implicit in this is that high levels of enforcement are desirable in order to deter AIS participants from driving without a valid licence, as well as from driving while disqualified or suspended. Where mandatory carriage of licence laws are in place (and/or police are technologically equipped to undertake roadside licence checks), it

is thus possible to quickly tell if a driver required to have an interlock fitted is driving a vehicle without one, and hence in contravention of the AIS requirements.

A related issue to this, as flagged by Sheehan et al (2006), is how interlocks should be managed as a sentencing option for offenders who were unlicensed (never held a licence) at the time of apprehension and sentencing. While Sheehan et al did not discuss this point further, Chamberlain and Solomon (2012) suggested that the threat of vehicle impoundment and/or full-time alcohol monitoring could motivate unlicensed drink drivers to participate in an AIS (see also Marques & Voas, 2010). Voas and Marques (2006) noted that a significant majority of drink drive offenders were not applying to regain their licence due to greatly increased insurance costs, the costs of re-licensing and completion of any treatment programs, and a belief that the risk of detection of driving unlicensed is low (see also Hands, 2003; Marques, 2009), all of which serve to increase the chances of the offender driving while unlicensed. Elder (2013) commented that driving unlicensed without detection and follow-on consequences may lead to a devaluing of the interlock program.

Many AIS evaluations acknowledge the problem of AIS participants sidestepping the restriction by illegally driving a non-interlock vehicle. Elder (2013) and some of the above mentioned studies go on to recommend interlock installation as soon as possible after conviction in an effort to minimise this tendency. It is generally known that a majority of suspended or disqualified drivers continue to drive at least occasionally during their ban and that such drivers are generally at a higher risk of crashing (Chamberlain & Solomon, 2012). However, Rauch et al (2002) and Voas, Tippetts and Grosz (2013b) note that some AIS drivers who drive non-interlock vehicles may drive shorter overall distances and drive more conservatively to avoid drawing enforcement attention.

AIS participants also drive illegally if they circumvent the fitted interlock by successfully tampering with the device. Fiedler et al (2012) report that this problem is being overcome in Oklahoma [and coincidentally also in South Australia] by creating tampering seals placed on devices (which are checked at servicing intervals), and by ensuring that participants are not allowed to directly observe interlock installation or servicing. Fiedler et al (2012) also report that other US states are training officers in what tampered interlock devices look like.

2.4.8 Interoperability of AISs between jurisdictions

Canada's experience with AISs originated in 1999 with a legislative amendment to the country's Criminal Code, to permit individual provinces to reduce the federal minimum one year prohibition on driving for drink drivers if the driver participated in an AIS. Since that time, Chamberlain and Solomon (2012) report that, despite federal endorsement and consensus on interlock best practice, the provinces have widely diverse AISs and consequently a broad range of participation rates. They go on to caution that,

"This means that offenders with identical criminal driving records are treated completely differently depending on their province of residence. It also sends out mixed messages about the incapacitation, rehabilitation and relicensing of offenders. Moreover, it means that interlock programmes are not achieving their potentially significant traffic safety benefits." (p. 347)

Offenders might also be treated differently if there are inconsistencies between jurisdictions in interlock usage data categories. Marques and Voas (2010) point out the need for agreement on how 'violation' is defined, for example. A single elevated breath test may be recorded as a violation. However, if a repeat breath test five minutes later is passed easily, this may be due to the initial test resulting in a fail when transient mouth alcohol provided a false reading (for example through recent mouthwash use or eating ripe fruit naturally containing alcohol). As another example, Fiedler et al

(2012) emphasise the need to ensure legislation is expressed in operational terms in order to promote greater interoperability. They report how one US state needed to draft legislation that was definitive for other jurisdictions in relation to requiring interlocks for every vehicle that an offender has 'access to'.

Marques and Voas (2010) also point out the need for inter-jurisdictional agreement on participant compliance standards, and the consequences for non-compliance, particularly for procedural violations, lockouts and circumvention attempts.

2.5 Best practice components of an effective AIS

The preceding discussion on AIS evolution, and outcome and operational effectiveness informs a consideration of the various components that would comprise best practice of an effective AIS. An early attempt at defining best practice for AISs involved two workshops in Canada attended by international researchers, interlock manufacturers, policy makers and program specialists (Beirness & Robertson, 2002). The best practice components identified in the workshops included:

- Viewing AISs, not just in terms of the interlock itself, but more broadly as coordinated activities also involving monitoring, communication and rehabilitation, and also as restriction allowing offenders to still drive rather than as a form of punishment.
- Legislation that clearly specifies the AIS administering authority, eligibility criteria, conditions of participation and prohibitions on circumvention.
- Interlock devices that meet the prevailing official standards for such devices.
- Service providers who understand AIS clientele and are committed to meeting their needs.
- Eligibility criteria that allow as many drink drive offenders as possible into the AIS, and as soon as possible, to minimise the temptation to drive while unlicensed.
- Using mandatory and voluntary forms of AIS in a complementary manner such that offenders who are not compelled to participate may elect to participate in exchange for a reduced period of licence suspension, as this would boost participation rates.
- The authority for AIS administration residing with the licensing agency, but still allowing courts to impose AIS participation.
- Regular monitoring of AIS participants, especially through downloaded interlock data.
- An AIS should be integrated with other drink drive and alcohol management programs.
- Duration of interlock term should depend on the participant's success in the program (based on a variety of measures) rather than a fixed interlock term.

To that last best practice component, it should be added that consideration should be given as to whether a fixed interlock term ought to be based around a minimum period. McCartt et al (2012) maintained that their research demonstrating a strong inverse association between interlock installation rates and recidivism rates affords substantial support for Washington State's requirement for a violation-free 4-month period before full licence status is regained. During this time, of course, interlock usage patterns need to be closely monitored. With monitoring generally, Vanlaar et al (2010) note that certain interlock usage patterns in the monitoring process are predictive of future recidivism and should therefore command prompt attention: for example, two or more elevated BAC readings in the early hours of the morning and high numbers of interlock warnings and failed attempts, particularly during the first five months on an interlock. Such patterns, if detected, should be followed up with the offender and appropriate actions taken as may be warranted (ibid).

Early researchers (e.g. Voas et al, 2002) suggested additional components for effective AISs, such as removing or reducing disincentives to AIS participation, by improving the rolling retest procedure, or by

subsidising participant costs, including insurance costs (where these are higher for AIS participants and full licence holders who were once AIS participants). Such recommendations have been realised in some of the AISs reviewed in the present report.

More recently, Marques and Voas (2010) developed a more comprehensive best practice analysis and their key points, along with those of other researchers, add to the list of best practice components, for example:

- The AIS (including the technical qualities of the interlock devices employed) should be compliant with an agreed set of standards for operating an AIS (Elder et al, 2011; Robertson et al, 2011).
- Increased AIS participation rates should be aimed for so that overall drink drive recidivism rates are improved and costs of alcohol related crashes are reduced (Voas, 1999; Willis et al, 2009; Elder et al, 2011).
- Increased participation can come from extending interlock law to cover any driver receiving a drink driving conviction, as in some American states (McCartt et al, 2012; Chamberlain & Solomon, 2012), and from including ongoing alcohol-dependent drivers who show they still comply with the AIS (Mathijssen, 2006; Robertson, Holmes & Vanlaar, 2012).
- Achieve a complementary balance between administrative and court-based AIS approaches (Robertson, Holmes & Vanlaar, 2012).
- Offender admittance to an AIS should occur as soon as possible after conviction (Hands, 2003; Schonfeld & Sheehan, 2004; Mathijssen, 2006; Robertson & Vanlaar, 2009; Marques & Voas, 2010; Elder et al, 2011).
- First offenders should be admissible to an AIS (Roth et al, 2007a; Robertson et al, 2009; Marques & Voas, 2010; Elder et al, 2011), even for low to moderate BAC's (McCartt et al, 2012).
- Educating prosecutors and judges is of utmost importance in jurisdictions that have court-based AIS sentencing provisions (Robertson, Holmes and Vanlaar, 2012).
- AIS participation should not be adversely affected by user costs (Woolley et al, 2003; Mathijssen, 2006; Robertson & Vanlaar, 2009; Elder et al, 2011); although any waiving or reductions in fines should not be allowed until the offender's AIS term is complete (Hands, 2003).
- AIS administration should not be too complex for participants and voluntary participants should have an opportunity to trial the device (Woolley et al, 2003).
- Interlock terms should be tailored to an offender's record of compliance with AIS conditions and related performance-based criteria (Freeman & Liossis, 2002b; Mathijssen, 2006; Clayton & Beirness, 2008; Robertson & Vanlaar, 2009; Willis et al, 2009; Zador et al, 2011; Elder et al, 2011; Robertson et al, 2011; Assailly & Cestac, 2013), for example by extending the interlock term based on demonstrated violations late in the existing interlock term (Marques & Voas, 2010).
- All AIS participants should be notified of every violation recorded by the interlock device throughout the term of the program (Zador et al, 2011).
- The full licence suspension term should not be more attractive than the full term assigned on the AIS (Woolley et al, 2003; Mathijssen, 2006; Elder et al, 2011).
- Treatment, holistic monitoring, counselling and other forms of support should, as far as possible, be integrated with the AIS (Mathijssen, 2006; Beirness et al, 2008; Robertson et al, 2009; Robertson et al, 2010; Marques & Voas, 2010; Elder et al, 2011; Chamberlain &

Solomon, 2012), and with the level of support provided matching the estimated risk of reoffending (Robertson, Holmes & Vanlaar, 2012).

- Participant transferability between interstate AISs should be facilitated (Robertson et al, 2010, 2011; Marques & Voas, 2010; Chamberlain & Solomon, 2012).
- Remote area access to interlock servicing and advice should be facilitated through the use of mobile units to allay rural area concerns (Woolley et al, 2003; Clayton & Beirness, 2008), although recent advances in communications technologies and capabilities may well be able to reduce or eliminate rural access difficulties.
- It should be ensured that interlock devices are almost impossible to circumvent undetected (aside from driving a non-interlock vehicle) (Mathijssen, 2006; Elder et al, 2011).
- Exchange of monitored data and information about interlock research and AIS evaluations should occur consistently between all agencies involved in administering the AIS (Woolley et al, 2003; Marques & Voas, 2010; Elder et al, 2011; Robertson et al, 2011).
- Sufficient staff should be allocated to administering the AIS, especially for usage monitoring of data in terms of both monitoring effectiveness for individual offenders as well as in terms of the AIS as a whole (Woolley et al, 2003; Vanlaar et al, 2010, Robertson et al, 2011).
- There should be adequate police enforcement of drink driving laws and strong powers to demand driver identity checks, not only to boost AIS participation but to also deter driving while suspended or disqualified (Mathijssen, 2006; Robertson et al, 2011; Robertson & Vanlaar, 2012; Chamberlain & Solomon, 2012).

Finally, there should be compliance with standards for evaluating AISs. As noted earlier, there is a paucity of evaluation studies of Australian AISs. This is despite some early pioneering work that established national guidelines for evaluating interlock programs (Soames Job Associates, 1998), although that work did not specify what constitutes a good AIS evaluation. Forward planning the structure and processes of an AIS should as far as possible reflect evaluation standards to enable a sound evaluation to be conducted. This includes ensuring that the monitoring processes, especially the interlock data content downloaded, are consistent with the required evaluation standards, particularly capability in meeting data needs for conducting program evaluations (Fiedler et al, 2012).

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