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Driver Experiences with the Alcohol Ignition Interlock: Comparing Successful and Poor Performers

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Abstract

Objectives: The purpose of this investigation was to compare the drinking patterns and experiences (both positive and negative) among DUI offenders who had installed an ignition interlock. The association between those experiences and interlock performance as measured by the number of times they had a lockout, was also assessed.

Methods: Over 300 DUI offenders who installed an interlocks in the State of Florida were recruited and completed an on-line survey at the beginning and end of their interlock restriction. A record of the interlock performance data from each was downloaded and used to determine how many lockouts they experienced during their interlock restriction period. Offenders were defined into two groups; successful cases (having 0 or 1 lockout) or poor performers (have 2 or more lockouts). Chi-square and binary regressions were used to assess differences between groups.

Results: Poor performers reported significantly more drinking and were more likely to drink in a context of emotional comfort, yet they were more likely to report positive experiences with the interlock, especially as to its ability to remind them to avoid another DUI by reducing their drinking and driving. No difference was found between these two groups for the interlock's ability to reduce drinking.

Conclusions: People with a more serious drinking pattern and who may be most at risk for recidivating may be more inclined to recognize the potential benefits of the interlock as a DUI preventive countermeasure. More research is needed to identify and influence high risk DUI offenders while on the interlock to increase its effectiveness once the interlock is removed.

Keywords

ignition interlock; DUI offenders; perceptions and behaviors

Introduction and Background

Motorists convicted of driving under the influence (DUI) during the prior three years are 3.81 times more likely than the average operator to be the impaired driver (BAC .08) responsible for a fatal alcohol-related crash (Voas & Tippetts, 2012). Drivers with such convictions during the prior three years comprise 7% of the drivers in fatal crashes (Voas, Tippetts & Grosz, 2012). Lund, McCartt, and Farmer (2012) and Fell (2014), estimated that if all drivers convicted during the last three years were prevented from being involved in a fatal crash with a positive BAC, 785 lives would have been saved in 2010. This supports the potential benefit of the national movement to mandate all DUI offenders to install vehicle ignition interlock devices, which require the driver to take a breath test before starting the car and prevents engine ignition if any significant amount of alcohol is detected. All 50 U.S. states have an ignition interlock program and approximately 350,000 impaired driving offenders had an interlock installed in 2017 (Robertson, et al 2018). Recent research (McCartt, Leaf & Farmer, 2018) indicates that states that toughen their interlock requirements for first time offenders can significantly reduce DUI recidivism.

The interlock has a major limitation as currently implemented: it functions only as an incapacitation method preventing impaired driving and provides a safety benefit only while on the offender's vehicle (Elder et al., 2011; Weinrath, 1997; Willis et al., 2004). Currently, the application of the interlock sanction is relatively short (six to twelve months for first-time offenders, one to two years for second-time offenders) compared to the lifetime of driving that follows. Thus, the impact of interlocks on the crash involvement of DUI offenders is substantially limited. This short period of application is a costly process for the offender at \$1,000 a year and a significant burden on court and motor vehicle monitoring staffs.

Despite the current lack of evidence for any carryover of effect to post-interlock driving, research suggests that there is a basis for believing that driving on the interlock provides an unexploited opportunity to produce behavioral change because users adapt to the interlock over time. Marques and colleagues (1999) demonstrated the reduction in lockout frequency as a function of the time since the device is on the offender's vehicle. A similar reduction over time on the interlock was reported in a recent study by Vanlaar et al. (2010). This learning phenomenon is significant because a number of studies have demonstrated that the lockout rate predicts future recidivism (Lund et al., 2012; Marques et al., 2001; Marques et al., 2003) and provides a dramatic example of the relationship of the number of lockouts while on the interlock to post-interlock recidivism. Thus, the lockout experience while on the interlock provides an important surrogate measure for likely DUI recidivism.

The evidence that offenders can learn to control the number of lockouts they experience and that the number of such events is associated with future recidivism provides substantial support for the following proposition: the period when the interlock is on the vehicle is an opportune time to treat and educate offenders in harm reduction strategies that preserve the safe behaviors that they adopt to cope with the interlock beyond its removal. While there have been some advocates for behavioral change interventions tied to interlock programs (Marques et al., 2003; Beirness & Marques, 2004; Timken & Marques (2001; and Timken et

al., 2012) few states have integrated treatment with their interlock programs (Voas et al., 2016).

Currently, the design and development of such supplemental programs is handicapped by a lack of information on the varying needs of the users to adapt to the interlock. Evidence by Beck, Kelley-Baker and Voas (2015) shows that DUI offenders on interlocks who changed the location of their drinking from a bar or restaurant to their homes, reported that they were more likely to change their drinking plans and habits (drank fewer drinks per occasion and reduced the amount they drank), and reported that they were more receptive to the interlock than offenders who did not change their drinking locations. Further evidence by Beck, Ahmed and Farkas (2011) showed that DUI offenders who drink in a context of emotional comfort are more likely to drive after knowing they have had too much to drink and they were more likely to have been involved in prior crashes as well as received a citation for their driving.

The objective of this study was to collect survey information on a set of experiential and social context factors that would predict lockouts among a sample of DUI offenders who participated in an interlock program in Florida. This study is important because it responds to a need to better understand the potential safety benefits to be gained by the policy of requiring interlocks for all impaired-driving offenders, regardless of their adaptation to the interlock. Currently, interlock policy is limited by its application as a short-term incapacitation procedure. This yields little, or no carryover of any beneficial behaviors adopted to cope with the interlock. This investigation examines experiences and behaviors while on the interlock. This information should be useful to program designers of interlock programs in their attempt to extend the effectiveness of interlocks after they are removed. Specifically, we were interested in the social context of their drinking and their experiences (both positive and negative) with the interlock.

METHODS

Data Collection and Procedures

Under state law in Florida (FL 316.193), for individuals arrested and convicted of a DUI on or after July 1, 2002, an alcohol ignition interlock is mandated by the court in the event the driver had a BAC of .15 or greater, had a minor in the car, or has had a prior DUI conviction. Drivers who had no prior conviction are not required to install the interlock unless court ordered to do so. All drivers in the current study were court ordered to install the interlock device.

With the approval of the Florida Department of Highway Safety and Motor Vehicles (DHSMV), we worked individually with three of the largest interlock companies that have operations in Florida to review our consent form and get approval from their legal departments to distribute study fliers to their customers and to secure participants' record of violations. The process of distributing our recruitment fliers was established with each company. Our recruitment flier invited new interlock users who were first time DWI offenders to participate in the study. The flier was distributed in multiple ways, depending on the interlock company: (1) via an email sent to new interlock users by the interlock company

communications personnel; (2) inserted into new customer information packets; or (3) distributed as a paper flier at a company interlock installation center or at one of the approximately 100 vendor interlock installation locations across the state. These vendor locations are often auto repair garages or radio installation businesses that have contracts with an interlock provider company to install interlocks.

Sending out an email with the study flier and an imbedded link to the Entry survey appeared to be the most effective way to generate the most study participants. From prior experience, we know that people need to see the study advertisement more than once before they respond, so we asked the interlock companies to display a poster about the study in their corporate installation centers. Two months after recruitment was initiated, the flier was expanded to invite not just first-time offenders, but all new interlock users (those who installed an interlock within the last 60 days).

The flier had a Survey Monkey link where participants could read a detailed description of the study and read and electronically signed the consent form. Once that was completed, participants filled out the Entry survey, which took about 15-20 minutes to complete. Participants had a choice of a \$50 money order or \$50 Target gift card to complete the Entry Survey. They provided their contact information so that we could follow up with them 6 months later to complete the Exit Survey. Participants again had the option to select a \$50 money order or \$50 Target gift card to complete the Exit Survey. Approximately $\frac{3}{4}$ of the incentives distributed were money orders and $\frac{1}{4}$ Target gift cards.

A total of 431 offenders participated in the survey, of which 368 (85.4%) completed both the entry and exit surveys; and 310 (71.9%) cases were able to be matched to their lockout data. The sample was predominately male, white and first offenders (see Table 1).

Measures

The principle dependent measure was the lockout. Participants were defined as successful cases ($N = 136$) if they had no more than one lockout during their interlock restriction. A total of 90 participants (66.2%) had no lockouts and 46 (33.8%) had one lockout. Poor performers ($N = 174$) were defined as having two or more lockouts. Their number of lockouts ranged from 2 to 59 and averaged 7.03 ($SD = 9.20$).

Interlock-related Experiences

Participants indicated which experiences (yes or no) they had while being on the interlock. A list of experiences were derived by the research team and were based on interviews with interlock participants from prior studies. There was a total of seven positive experiences (e.g., "it gave me independence") and five negative experiences (e.g., "it restricted my freedom").

Interlock Performance

For the current study, data was not available for drivers on the number of clean starts (i.e., attempts where drivers had a recorded BAC of less than or equal to .025). This means, we were unable to calculate ratios of clean starts to failed attempts (i.e., attempts where drivers

had a BAC greater than .025). As a result, for analyses examining interlock performance, we used the dichotomized outcome measure: (1) zero or one lockout or (2) two or more lockouts. This is consistent with prior literature which demonstrated that drivers who receive one or no lockouts while the interlock is installed on their vehicle are significantly less likely to recidivate following the device removal, relative to those with two or more lockouts (Voas, et al. 2016; Voas, 2020).

Frequency of Drinking

Four questions asked about their drinking while on the interlock. The first asked if they had stopped drinking (yes or no). A second question asked if the person still drank but in smaller amounts (yes or no). The third asked how many alcoholic beverages they consume per week while on the interlock. Response options were “0” (scored as 0), “1-2” (scored as 1), “3-4” (scored as 2), “5-7” (scored as 3), “8 – 14” (scored as 4) and “more than 14” (scored as 5). The fourth question asked how many drinks containing alcohol do they have on a typical day when they were drinking. Response options ranged from “0” (scored as 0), “1-2” (scored as 1), “3-4” (scored as 2), “5-6” (scored as 3), “7-9” (scored as 4) and “more than 10” (scored as 5).

Social Context of Drinking

The items used to measure the social contexts of drinking were taken from a prior investigation of DUI offenders (Beck et al. 2011). Participants were asked how often they drank alcohol for a variety of reasons. Each item used response options ranging from never (scored as 1) to frequently (scored as 4). Those items comprising the first social facilitation factor included “drinking at a party with friends,” “to be sociable,” “to have a good time,” and “while at a public function.” The items comprising the second emotional comfort factor included drinking “alone,” “to relieve fatigue or tension,” “for a sense of well-being,” “to get rid of depression,” “to relieve stress,” “to blow off steam,” “before or after work at a bar or restaurant,” and “to feel better about yourself.” Previous research with adolescents (Beck & Treiman, 1996), college students (Beck et al., 2013) and drivers aged 65 or older (Beck, Zanjani & Allen, 2019) have consistently demonstrated the factor structure and reliability of these factors (Cronbach’s alphas > .737) which was replicated in this investigation.

Analysis

Data were analyzed using IBM SPSS v.21 (IBM Corp. 2012). Bivariate correlations were conducted to examine the intercorrelations between independent and dependent variables and to check for multicollinearity. None of the variables exceeded $r = .8$, and did not violate the assumption of multicollinearity. No other assumptions of violations were noted. Variables included in the analysis included driver sex, race, income, education and prior DUI status. Binary logistic regression analyses were then conducted using interlock-related experience variables as dependent variables, and the aforementioned control variables and binary membership to either the poor performance or successful performers group as independent variables. Binary logistic regression analysis was deemed appropriate due to the dichotomous nature of the outcome variable and its ability to handle both categorical and continuous predictor variables.

RESULTS

The analytic sample was predominately male (57.9%), white (78.8%) and was evenly distributed by the education levels of high school to 4-year college degree. A majority (59.8%) of the participants had no prior DUI conviction (see Table 1). Successful vs. poor performers did not vary by gender, education level, income level or prior DUI convictions. However, those who identified as White (47.7%) were more likely to be successful performers than those who identified as Black (20.7%), $\chi^2 = 7.65$, $p < .05$. No other significant differences were noted by driver's self-reported race. Drivers in the "successful" condition had between 0 and 1 lockouts ($M = 0.34$, $SD = 0.47$), while drivers in the "poor" performers condition had between 2 and 59 lockouts while the interlock was installed ($M = 7.04$, $SD = 9.20$).

Table 2 lists frequencies of affirmative responses to each statement of their experiences with the interlock. Items were assessed by using chi-square statistics to evaluate if there were significant differences between drivers based on their lockout performance. Four items assessing positive experiences about the device were found to be significantly different between participants who were defined as successful on the interlock (0-1 lockout) versus those who were poor performers (2+ lockouts). Specifically, these items included making drivers more aware of their drinking and driving behaviors, reminding them to limit their drinking and driving, helping to protect innocent people from their drunk driving, and reducing overall drinking and driving. All of the poor performers reported higher rates of the positive perceptions. The most frequently endorsed positive experience, common for both groups of drivers, was that the interlock gave them more independence (56% - 58%). There were no significant differences for the negative experiences. The most frequently endorsed negative experiences, common for both groups, were that the interlock was an embarrassment (43% - 46%) and it caused a financial hardship (40% - 45%).

There was no difference in the number of poor performers (4.6%) and successful cases (7.4%) who stopped drinking while on the interlock. The poor performers (23.0%) were more likely to say that they drink but in smaller amounts than the successful cases (5.9%), $\chi^2 = 17.07$, $p < .01$. However, poor performers reported drinking more alcoholic beverages per week than successful cases ($M = 2.07$ vs. 1.24), $t = 3.19$, $p < .01$ and more drinks on the day they did drink ($M = 1.08$ vs. 0.71), $t = 2.39$, $p < .02$. When they did drink, poor performers ($M = 12.63$) were significantly more likely to drink in a context of emotional comfort than successful cases ($M = 10.37$), $t = 2.150$, $p < .05$. There were no significant differences in how frequently they drank in a context of social facilitation ($M = 7.51$ vs. 6.61).

Table 3 reports the regression estimates of the multivariate binary logistic regression analysis. After controlling for the effects of driver sex, race, income, education, and prior DUI status, drivers who were in the poor performers condition were almost two times more likely than the successful performers to report (1) that the device made them more aware of their drinking and driving ($\beta = 1.86$, $p = .011$), (2) feeling that the device reminded them to limit their drinking to avoid another DUI ($\beta = 1.92$, $p = .010$), (3) that the device helped protect innocent people from their drinking and driving ($\beta = 1.80$, $p = .049$), and (4) that the

device reduced their drinking and driving ($\beta = 2.15$, $p = .007$). No additional significant relationships were detected between the two groups of drivers.

DISCUSSION

Interlock offenders who may be at greater risk for a subsequent DUI offense (i.e., poor performers) had on average 7 lockouts during the period when their interlock was installed. They were more likely to report drinking and to drink in a context of emotional comfort than those cases defined as less at risk for a subsequent DUI offense. These characteristics are consistent with previous research (Beck, Ahmed & Farkas, 2011) that indicated that people with these drinking patterns are more likely to report drinking and driving. Yet, it is interesting that these higher risk cases also were more likely to report a number of positive experiences with the interlock than their lower risk comparison group (those with 0 or 1 lockout). Poor performers were about two times more likely to report that the interlock: made them more aware of their drinking; served as a reminder to avoid drinking to avoid another DUI; helped protect innocent people from their drunk driving; and helped reduce their drinking and driving.

While the cost and embarrassment factors were common to both groups, there was no significant difference between the two groups detected. However, the poor performers appeared to be appreciative that the interlock made them more aware of their drinking and driving risk. This appears to be not only from a legal perspective (avoiding another DUI) both from a moral or societal one as well (help protect innocent people). Thus, these poor performers know that they are at higher risk and may be more likely to recognize the potential benefits of the interlock. In contrast, the successful cases may not be as apt to recognize their risk, either because they have successfully adapted to the interlock (given their absence of lockouts), or they do not perceive their drinking pattern as problematic as the poor performers.

There was no significant difference in the proportion of people in either group who said that the interlock reduced their drinking - which is consistent with prior literature that suggests drivers do not significantly change their alcohol-related behaviors (Marques et al., 2010). However, poor performers were more likely to report that they were drinking in smaller amounts than before, even though it was not necessarily because of the interlock. This may indicate an important factor behind interlock acceptance. It does not interfere with drinking, although some people may elect to reduce their drinking anyway for a variety of other reasons (e.g., the DUI arrest and resultant conviction, a probation requirement, as well as any fines, legal fees, etc.) not because of the interlock per se.

Future research should address the additional experiences and social influence factors that shape a DUI offender's likelihood of adapting successfully to interlock. Despite clear evidence that interlocks are an effective intervention for preventing drinking and driving, while they are in use, little is known about the factors that modify one's willingness to adapt to the interlock and remain DUI free after it has been removed. While the lockout record generated by the interlock device has been shown to be a valid surrogate measure of recidivism, additional investigation needs to be conducted to see if the efficacy of the

interlock restriction period can be enhanced through more intensive behavioral and cognitive modification intervention. The results of this investigation indicate that those at greater risk are more likely to embrace the positive aspects of the interlock that promote awareness of and reminders to avoid drinking and driving. The next step is to develop modalities of delivery that effectively deliver this message to the offenders. Our results suggest that those at greater risk may be more receptive to this information.

The finding that drivers who identified as White were significantly more likely to be in the successful performers group than participants who identified as Black is curious. It is feasible that this difference is due to disposable resources. Though it was not significant, participants who identified as Black reported lower levels of familial income. If an individual who has less disposable income consumed too much alcohol, they may be less likely to call a cab or rideshare service. This would necessarily mean that they have to drive home, putting them at greater risk of receiving a lockout. Future research could attempt to examine if it is indeed a matter of disposable income or if there are other systemic concerns that may disproportionately disadvantage drivers who identify as Black.

Finally, the limitations of this investigation need to be acknowledged. First, the principle psychosocial traits of social context, drinking behavior and experiences used self-report measures, and as such had a certain unknown degree of social desirability bias. Considerable efforts were made to obtain their informed consent and to assure them that their answers would not be shared with the Florida Department of Highway Safety and Motor Vehicles or their interlock provider. Second, the size of the sample of interlock participants we were able to recruit, and obtain their interlock lockout data, may have reduced the level of statistical power and limited our ability to detect differences. Citing legal reasons, not all interlock companies were willing to provide us with complete data on interlock performance, despite the offenders' permission to do so. This relates to the third concern which was that we would have preferred to use a more outcome robust measure which adjusted for exposure (e.g., a ratio of interlock lockouts / clean starts). Unfortunately, clean start data was not available for a majority of the sample. Without information on clean starts, we were unable to calculate ratios or proportions of fails (i.e., attempts where the driver's BAC was greater than .025). Thus, we were forced to use a less robust, but a more statistically powerful measure to compare differences between these groups. Additionally, as is the case with most interventions requiring behavioral adaptation, it is conceivable that there is a learning curve as drivers adapt to the interlock device. Though the behavioral adaptation required is clear – don't drink prior to driving – establishing when lockouts occur could provide valuable additional information. That is, conceivably, getting a lockout immediately when the device is installed is a better outcome than someone who only got one lockout but did so later in the installation period. Unfortunately, interlock data in the current study was only provided in aggregate from the interlock providers. Future data collections should ensure that obtaining clean data as well as lockout data is collected on a monthly basis.

Despite these limitations, the results of this investigation had several strengths. First, this investigation used multiple sources of data and did not rely solely on self-report alone. This is especially important with populations of high-risk drivers. In addition, the difficulty in securing interlock data from interlock providers gave us valuable information for future

studies on the need to carefully tailor consent information that ensures the appropriate data release permission from participants that reassures interlock companies and their legal teams that all sides agree to the language in the current consent form.

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Table 1.

Demographic characteristics of the sample

	N*	%
Gender		
Female	155	42.1
Male	213	57.9
Race		
White	290	78.8
Black	32	8.7
Other	42	12.0
Education		
< High School	9	2.4
High School/GED	86	23.6
Some college	100	27.4
2-year degree	59	16.2
4-year degree	90	24.7
Advanced degree	21	5.7
Income (\$)		
0 – 25K	96	26.5
25 – 50	133	36.7
50 – 75	68	18.8
75 – 100K	31	8.6
100K+	34	9.4
Prior DUI Convictions		
No	220	59.8
Yes	139	37.8

* numbers vary slightly due to missing data

Table 2.

Experiences with the interlock of successful and poor performers

Positive Experiences	Successful N = 136	Poor N = 174	χ^2
It gave me independence	80 (58%)	99 (56%)	0.12
It made me more aware of my drinking and driving	58 (42%)	102 (58%)	7.79 *
It reminded me to limit my drinking to avoid another DUI	38 (27%)	78 (44%)	9.30 *
It allowed me to help out with family responsibilities	31 (22%)	33 (19%)	0.69
It helped protect innocent people from my drunk driving	22 (16%)	43 (24%)	3.36 *
It reduced my drinking and driving	27 (20%)	56 (32%)	5.92 *
It reduced my drinking overall	57 (42%)	88 (51%)	2.30
Negative Experiences			
It served no purpose whatsoever	5 (4%)	4 (3%)	0.51
It restricted my freedom	31 (23%)	43 (24%)	0.16
It was an embarrassment	62 (46%)	74 (43%)	0.29
It caused financial hardship	55 (40%)	79 (45%)	0.77
It was just another reason to be pissed off about the government	10 (7%)	13 (7%)	0.01

*
p < .05

Table 3.

Bivariate regression estimates of poor performers vs successful performers (referent) on interlock. ^{*I*}

Positive Experiences	β	95% CI	<i>p</i> -value
It gave me independence	0.87	0.54-1.39	.562
It made me more aware of my drinking and driving	1.86	1.16-2.98	.011
It reminded me to limit my drinking to avoid another DUI	1.92	1.16-3.16	.010
It allowed me to help out with family responsibilities	0.79	0.45-1.41	.424
It helped protect innocent people from my drunk driving	1.80	1.00-3.25	.049
It reduced my drinking and driving	2.15	1.23-3.75	.007
It reduced my drinking overall	1.47	0.92-2.34	.110
Negative Experiences			
It served no purpose whatsoever	0.60	0.16-2.32	.461
It restricted my freedom	1.02	0.59-1.76	.942
It was an embarrassment	0.87	0.55-1.40	.570
It caused financial hardship	1.22	0.76-1.97	.406
It was just another reason to be pissed off about the government	1.00	0.38-2.64	.996

^{*I*} indicates that analyses controlled for participant sex, race, income, education and prior DUI status.