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Motivational Counseling Reduces Future Police Charges in Court Referred Youth

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Abstract

By the age of 18, between 16–27% of adolescents in the U.S. have been arrested for an offense and by the age of 23 this increases to a staggering 25 to 41%. Most youth that get into legal trouble have a substance abuse problem and many youth report high risk driving behaviors. Adjudication of adolescents for an offense may provide an opportunity to provide a secondary prevention program for such high risk behaviors. In this regard the primary aim of the present study was to test two hypotheses: 1) That interventions involving group motivational interviewing would decrease future legal charges beyond those achieved by the combination of sanctions and remedial actions otherwise mandated by the court; and 2) that the addition of a trauma room exposure to the group MI intervention would increase the effectiveness of MI in decreasing these future legal charges.

Court mandated youth who have had a high risk driving police charge and/or alcohol related police charge and who are drivers (N= 992) were randomly assigned to one of three 20 hour interventions; enhanced Prototypic Community Service (CS), Motivational Intervention with typical community service (MI), and Motivational Intervention with exposure to a hospital trauma center (MI-H). As hypothesized, the probability of being charged with an offense within the 6 months post-treatment was significantly less for participants in the combined MI groups than those in the CS group. The combined MI groups also had significantly fewer overall number of police charge events than the CS group at 6 months. Mediation analyses revealed that the relationship between MI vs. CS interventions and subsequent police charges was partially accounted for by the youth's experience of the MI component of the intervention. Despite fewer police charges at 6 months the combined MI group reported 1) significantly more hazardous drinking and 2) a greater

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amount of speeding and distracted driving than the control group over this same 6 month period. Hypothesis 2, that MI-H would be more effective than MI in reducing police charges, was not supported. This was so despite evidence supporting the hypotheses that 1) trauma room exposure would increase participants' emotional arousal during the intervention and 2) increased arousal would be predictive of fewer police charges. Despite support for the theorized causal pathway, the combination of trauma room exposure and MI did not result in better outcomes than MI combined with traditional community service. Given this discrepancy between empirical supports for the theory in the face of the absence of incremental effectiveness of the MI-H treatment condition, a better understanding of the participant's hospital experience will be necessary if we are to successfully utilize the trauma room exposure to increase the effectiveness of MI interventions for this target group to achieve better outcomes.

Introduction

By the age of 18, between 16–27% of adolescents in the United States has been arrested for any offense (Brame, Turner, Paternoster, & Bushway, 2011). And by the age of 23 this increases to a staggering 25 to 41%. Considering these estimates do not include minor traffic offenses the total number of youth who are adjudicated within the judicial system is enormous. Most youth that get into legal trouble have a substance abuse problem (Binard & Pricard, 2008; Substance Abuse and Mental Health Services [SAMSHA], 2012) and overall many youth report high risk driving behaviors (Centers for Disease Control and Prevention [CDC], 2010). A recent study has shown a major violation such as speeding and alcohol related infractions will increase an individual's mortality risk from related and unrelated causes (LexisNexis & RGA Reinsurance Company, 2012). Adjudication of adolescents for any offense may provide an opportunity to provide a program to prevent such high risk behaviors. In this regard the present study was designed to determine whether the addition of a counseling program based on motivational interviewing that focuses on risky driving and alcohol use would decrease future charges.

While young drivers between the ages of 15–20 years represent only 6.3% of licensed drivers in the US, 13.6% of all driver motor vehicle crash (MVC) fatalities involved young drivers. Teens (16–19 years old) per mile driven are four times more likely to be involved in an MVC than those older (NHTSA, 2006a). In 2009 more than 350,000 teens (15–19 years old) received treatment in an emergency department (ED) for an MVC related injury and about 3000 were fatally injured. This statistic has ranked MVC as the leading cause of death and injury for 15–20 year olds (CDC, 2010).

Teens are more likely to engage in high-risk driving behaviors (CDC, 2010) which often result in moving traffic violations; and in turn, moving traffic violations are predictive of MVCs (Gebers, Tashima, & Marsh 1987). Prevalent teen high-risk driving behaviors for example include high speed driving, driving with distractions and driving after drinking alcohol (e.g., NHTSA, 2009; CDC, 2009). It has been demonstrated that over a 3 year period having one moving traffic violation increases the likelihood of an MVC by 65%, while two moving traffic violations increases this risk by 110% during the following one year period (Gebers, Tashima, & Marsh 1987). Therefore teens who have received a traffic citation are at greater risk of an MVC and would be a good target group for a secondary prevention program.

Irrespective of driving, the negative consequences of alcohol use among youth are significant. Interestingly most youth that are involved within the court system are screened as having a substance abuse problem (Binard & Pricard, 2008; SAMSHA, 2012). Also considering their age, any use may be problematic as well as a precursor to continued legal

infractions. In a previous study we found that many youth who are charged with a driving offense and were referred to a prevention program report problematic alcohol use, and many youth who are charged with an alcohol offense report high risk driving (Nirenberg, Baird, Mello & Longabaugh, 2009). This relationship points to the potential opportunity for an intervention coincident with an offense, either driving or alcohol related, that would reduce subsequent alcohol and/or high risk driving offenses and more distally, MVCs.

Many counseling/prevention programs are didactic-based having an immediate goal of increasing awareness of the dangers of high risk driving with the hope that this awareness will lead to less risky behaviors. However, it appears that even prior to an intervention teens are already aware of the risks of dangerous driving. Reyna and Farley (2006) have found that teenagers actually overestimate the risk. However as they weigh the risks and the benefits, they tend to choose the risky behavior. Therefore an intervention must take into account that awareness of high risk may not in itself be an effective deterrence.

As suggested by Baer and Peterson (2002), motivational interviewing (MI) may be particularly well suited for use with teens. During adolescence in an attempt to develop autonomy and individualization, there is a tendency to question and resist authority figures (Masterman & Kelly, 2003). Rather than confrontation, adolescents may be more responsive to an MI approach that respects their independence, provides a variety of options, promotes the exploration of the pros and cons and related ambivalence, in an effort to decrease resistance and develop motivation for change. The MI approach promotes a look to future personal goals and provides the teen an opportunity to examine whether their immediate choice of a risky behavior will be a stumbling block to their future goal attainment. Also the suitability of MI for adult patients who are more angry and oppositional at the start of treatment (Karno & Longabaugh, 2004) suggests that this approach may be particularly suited to adolescents, especially those who may have had negative experiences with authority figures, such as the police or court officials.

MI has been adapted for use in a wide array of settings and populations, varying its content and format to suite the goals of the intervention. Despite these variations, adapted motivational interviewing (AMI) has a strong empirical base to support its efficacy (Hettema & Miller, 2005). However, only a few studies have examined the efficacy of AMI on high risk driving among youth. Stein et al. (2006) found that incarcerated adolescents who received MI reported that they engaged in drinking and driving and being a passenger in a car with a drunk driver less often than those in a control group. Monti et al. (1999) found that older adolescents with an alcohol related event who were seen in the ED reported less drinking and driving and fewer traffic convictions if they received MI as compared to those in the control group. In a follow-up cost-effectiveness study the authors (Neighbors, Barnett, Rohsenow, Colby & Monti, 2010) reported that the cost effectiveness ratio was also more favorable for the MI as compared to control. In a subsequent study Monti et al. (2007) found that while MI had a positive effect on alcohol consumption, driving convictions changed equally for the MI and control groups.

Although AMI has usually been delivered as an individual intervention, there is also a growing body of literature demonstrating some effectiveness of AMI delivered in a group setting (D'Amico et al., 2011). Group AMI has been found to be effective in delivering some of the hypothesized active ingredients of MI such as non-confrontational style, empathic and collaborative (D'Amico et al., 2011; Foote 1999). Engle et al (2010) have found that commitment language in group MI as well as individual MI relates to positive outcome. It appears that a group approach to AMI may work particularly well with adolescents (D'Amico et al., 2011). The effectiveness of a group delivery of AMI has also been

demonstrated in the reduction of marijuana use among adolescents (Battjes et al., 2004; Engle, Macgowan, Wagner & Arnheim, 2010).

Vicarious learning (where learning can take place even when consequences are delivered to someone other than the learner) offers a sound theoretical basis for the value of the group format. Vicarious learning happens when the observation of the reinforcement or punishment of an observed behavior affects the future probability of the learner demonstrating that behavior (Masia & Chase, 1997). Afforded the opportunity to listen to the details of recent negative consequences (e.g., legal, financial, social, family and medical) related to other group member's court referral provides vital data for the individual group member that may be used in weighing the options on how to proceed. In the present study we examined two levels of vicarious learning within an MI intervention. The first involved MI in a group session in which participants could learn from each other's experiences. The second involved MI in a group session coupled with exposure to a hospital ED/trauma center (MI-H). During the time participants spent in the ED they observed first-hand the consequences of high-risk driving behaviors and injuries/medical problems resulting from drinking. While the participants are not the injured person, they too may have been involved in high-risk driving infractions or drinking behavior. Personally observing these consequences of high-risk driving or drinking before they have had to experience the consequences allowed them the opportunity to understand the impact of trauma without being the victim. It was hypothesized that exposure to potential negative consequences of high risk behavior afforded by the ED would enhance the effectiveness of MI.

This current study is in part developed from prior research conducted with court referred youth by this research group. We have tested the effects of an earlier version of MI-H in comparison to a typical community service program otherwise mandated by the courts, in reducing police charges. The results of this study revealed no differential advantage to the MI-H group over community service (Baird et al. 2012). The intervention examined in the current study, while similar to the earlier version, has been significantly changed. The MI components of the current study were enhanced by: 1) increasing the length of each session to allow for additional MI related group activities; 2) offering participants an opportunity to engage in an experiment with change; and 3) providing an individual MI session with the interventionist that allowed for greater personalization of their problems and change plan. The ED experience component was enhanced by increasing participant's exposure to other areas in the hospital (i.e. trauma intensive care unit) that highlight the long term negative consequences of high risk behavior (e.g., hospitalized teenager who is permanently paralyzed due to a DUI). With these enhancements implemented, we anticipated that the superiority of the MI-H treatment over CS would become apparent. In order to unconfound the effects of the combined hospital & MI experience with MI effects, we added an MI-only condition to the MI-H and CS treatment conditions.

The objectives of the present randomized control study were to test the effect of MI delivered in a group format in reducing: (1) 6-month police charges, (2) 6-month risky driving behavior factors and (3) 6-month hazardous drinking. Also we tested a mediational model to explain the predicted enhanced effect of MI vs. enhanced prototypic Community Service (CS) on the 6-month outcomes variables. Our second primary objective was to test whether exposure to the ED would enhance the effectiveness of MI in improving intervention outcomes. We hypothesized that the increased arousal and relevance of the hospital experience would be synergistic with the MI group experience to enhance the treatment outcomes of MI-H vs. MI participants. Our over-arching conceptual model predicted that MI treatment would lead to greater participant MI therapeutic experience and this experience would in turn lead to less risky behaviors (i.e. reduction of alcohol use, reduction of high risk driving) and fewer future police charges.

Methods

The Subject Population

In order to qualify for inclusion in the study, participants were: (1) ages 16 through 20 years (2) referred by the Rhode Island Judicial System to the ROAD program (a 20 hour program described below) as the result of a high-risk driving (e.g., speeding, reckless driving) and/or an alcohol/drug charge to attend the program, and (3) be drivers. Participants (and at least one parent of all minors) had to attend an initial meeting at which time the protocol was explained, they were consented into the research study, the youth completed an assessment battery, and were randomized into enhanced Community Service (CS), Motivational Intervention with typical community service (MI), or Motivational Intervention with exposure to a hospital trauma center (MI-H) group. Participants were given \$25 compensation for completion of the baseline assessment evaluation and \$35 for completion of a 6 month follow-up. Subject sample size was calculated by using an effect size of $d=.32$ which was determined from a review of pertinent research on MI. All procedures were approved by the hospital's institutional review board. A certificate of confidentiality was obtained from NIH.

Interventions

Community Service (CS): As part of their court mandated sanctions, all youth convicted of a legal charge were required to complete 20 hours of community service. Community service normally involves a wide array of activities, but none of which included the key components of the MI conditions. In order to homogenize this comparison group prototypic community service organizations were chosen and participant involvement was monitored by the research staff. Otherwise, CS was ecologically valid, as this component of their mandatory sanctions was the same as community service administered via other agencies. However since we anticipated minimal effect of typical community service on the risk behaviors associated with the charge leading to the ROAD program referral, to strengthen this program we added two didactic educational sessions. Participants received an introductory session preparing them for their community service, and an educational session (1.5 hours) on MVCs and related injuries, seat belt safety, and high risk driving behaviors. CS participants completed 13 hours of community service at the designated location (e.g., Salvation Army, YMCA). After completing their community service they attended a final wrap-up session (1.5 hours) focusing on their experience and then completed post program assessments.

Motivational Intervention (MI) and Motivational Intervention-Hospital (MI-H) were based on an adapted group motivational intervention (AMI) (Lincourt, Kuettel & Bombardier, 2001; Foote & DeLuca, 1999; Bailey, Baker, Webster & Lewin, 2004). Important principles of AMI included the pivotal role of the youth in any decision to change behavior, the locus of control for behavior change resting with the youth, and the non-judgmental role of the counselor and other group members. Both MI and MI-H groups received five MI sessions which included four group MI sessions (3 hours each) and one concluding individual MI session (one hour). MI and MI-H participants were in separate groups. The first group session was introductory, explaining the components of the program and introducing the youth to the setting of each community service location (i.e. hospital or community), a discussion of the ground rules for group work, and the requirement for exercises completed outside of the group. The participants shared what their feelings were about being referred to the program, the reasons why they were referred, and their feelings, both positive and negative about being part of the group.

In the second AMI session (2 hours) the MI and MI-H participants received (1) an interactive educational session on the various types of MVCs and related injuries, seat belt

safety, and high risk driving behaviors and (2) an introduction to the concept of decisional balance in relation to alcohol use and the high-risk driving behaviors. Participants were asked to share the pros and cons of high-risk driving behaviors and alcohol use. The counselor discussed stages and processes of change, utilizing the direct experiences the participants had shared. The counselor provided feedback to the participants regarding norms of peer alcohol and drug use and used reflective listening and summarizing techniques to establish the pros and cons of alcohol use and high-risk driving behaviors among the participants. Participants were guided in an experiment of change in which they were able to choose an initial behavior they wanted to change, and develop a related change plan. They were encouraged to implement the change plan over the next week, and be ready to seek feedback from the group at the next session on their success or failure, and supports and barriers to change. This allowed them to work out the potential problems they may face in implementing their final change plan.

After the second and third AMI sessions MI and MI-H participants completed the direct 6 hour experiential learning experience component. Similar to CS, MI participants were assigned to a designated community location. Instead of receiving an assignment to an experiential learning experience placement, MI-H participants were assigned to two 3-hour sessions in the hospital ED. The hospital trauma center experience was facilitated by 3 mentors, who were emergency medical technicians (EMTs). The participants were assigned in pairs to a mentor. During these sessions, the mentors navigated the participant's interactions with trauma center medical staff and maximized the participant's exposure to the sights, sounds and smells of the ED and other trauma service areas. The hospital experience occurred at a Level 1 Trauma Center located within a busy hospital in southeastern New England. All participants were exposed to a variety of serious traumas, as well as less serious injuries that were directly related to alcohol and other drugs and/or MVCs. This occurred in the hospital on two consecutive weekends, alternating between an earlier shift (8pm–11pm) and a later shift (11pm–2am). The ED experience was designed as an experiential session and not an MI session.

The third group AMI session occurred after the first community or hospital experience. This session allowed the participants to reflect on their experiences. The counselor used the experiences to assist them in focusing on future goals and values and how current alcohol use and high-risk driving fitted into those goals. Participants also discussed their experiment with change.

The fourth group AMI session took place after the completion of the second community service or hospital experience. The counselor helped the participants to process what they had experienced and to determine if the experience changed the alcohol use and/or high-risk driving behavior decisional balance previously completed by the participants. The main theme of this AMI session was on preparation for change including enabling the participants to create a change plan. When change talk was elicited from the participants the counselor used the importance and confidence ladders to facilitate a discussion concerning motivation and action to change.

The final AMI meeting was conducted individually. This gave participants an opportunity to discuss any issues they had not felt comfortable discussing in the group (e.g., family or other relationship issues, depression, anxiety, legal concerns). Individual change plans were discussed and modified in terms of any new information presented by the participant.

Counselor Credentials, Training, Supervision, and Intervention Fidelity

The two MA level trained counselors who facilitated the MI and MI-H groups were trained in MI. Initially, MI training involved (1) completing an intensive two-day training workshop

in MI that was tailored for the grant intervention (e.g., focus on adolescents, group format, and alcohol and driving safety issues) which was conducted by a member of the international MI Network of Trainers (MINT). Prior to this training the counselors were required to read the Miller and Rollnick (2002) book on MI, view a variety of MI training tapes and exhibit a thorough understanding of the intervention protocol manual which detailed specifically how to apply MI principles and techniques in the context of this study. Then over the next 2 months the counselors met with the PI (a clinical psychologist with over 18 years of experience in supervising counselors in the use of MI in a hospital setting) to practice and receive feedback on the treatment protocol. When the interventions commenced counselors met with the PI on a weekly basis for supervision. While counselors were expected to cover all of the material in the treatment manual they were encouraged to utilize the manual as a guide and whenever possible allow the participants to establish the pace and direction. All group sessions were audio-taped and on a bi-weekly basis a sample of these tapes was reviewed by the PI and feedback was provided. In order to test for fidelity to MI, participants in the MI groups completed the Motivational Interviewing Experience form (see below for description) after each MI group meeting.

Hospital trauma center Emergency Medical Technicians: The hospital ED experience was facilitated by 3 mentors, who were emergency medical technicians (EMTs). The mentors received training in providing participants an experience that maximizes the exposure to trauma that was related to high risk driving and/or alcohol abuse. The mentors navigated the participant's interactions with trauma center medical and nursing staff. The mentors were not trained in the delivery of MI, but in contrast they were trained to be directive and explicit in their approach in order to magnify the arousal and relevance of the trauma room experiences to the youth's own experience.

Data Collection

Data included in the present analyses were collected over 3 time points including: (1) pre-randomization, (2) across the intervention sessions and immediately at treatment completion, and (3) at 6-month follow-up. Baseline and 6-month follow-up driving offenses from court records were recorded. At six-months from program completion, participants were re-interviewed regarding their self-reported high risk driving behaviors and offenses, drinking, drinking problems and high-risk behaviors. The six-month follow-up rate for court data was 98.3% and self report data was 93.2%.

AUDIT—The AUDIT is a ten-item self-report instrument used to determine whether the participant is drinking in a hazardous manner (Saunders, Aasland, Babor, De La fuente & Grant, 1993). Drinking patterns and alcohol-related negative consequences are assessed. The total AUDIT score is the weighted sum of the 10 items. Using the summed score, for adults a cutoff score of eight or more for males and six or more for females is indicative of hazardous drinking. The AUDIT has good internal reliability with Cronbach alphas ranging from .80 to .94 and good sensitivity and specificity at cut off score of 8 or more (Fleming, Barry & MacDonald, 1991; Saunders et al., 1993; Daeppen, Yersin, Landry, Pecoud & Decrey, 2000). For adolescents a lower cutoff score has been recommended (Fairlie, Sindelar, Eaton & Spirito, 2006; Santis, Garmendia, Acuna, Alvarado & Arteaga, 2009). As suggested by Fairlie et al 2006, in the present study a cut off score of 4 was chosen as AUDIT-positive. In addition, Donovan (2009) found that lower quantities of alcohol use by adolescents may have equivalent effects as higher levels of adult use. In this regard, for item 3 of the AUDIT we have substituted 4 or more drinks on one occasion as the binge item, in place of the 6 or more used for adults. The AUDIT was administered at baseline and at 6 month follow-up.

Police Charges—Recording of all police charges were completed by a court positioned research assistant. Computerized databases from RI Traffic Court, RI District Court and RI Family Court were reviewed. The review included police charges that occurred during the 6 months prior to the participant randomization and the 6 months following treatment participation. Specific charges were recorded and then were categorized as driving related and/or alcohol related. High-risk driving police charges (e.g., speeding and reckless driving) were typically addressed in the District Court and Traffic Court. Alcohol-related convictions were typically addressed in the District Court and Family Court (e.g., DUI, DWI, driving under the influence of a controlled substance, refusal to take a breathalyzer, transportation of alcohol by a minor). The primary dependent variables were 1) the presence vs. the absence of a high-risk driving or alcohol related police charge and (2) the number of high-risk driving or alcohol related police charge events during the six months following program completion.

Emotional arousal and relevance—To measure the arousal associated with the hospital observation or community service experience a modified version of the PANAS was used (Positive and Negative Affect Schedule; Watson & Clark, 1988). This PANAS scale contains a list of 20 adjectives that describe positive and negative affects the respondent ascribed to themselves, with each adjective being rated on a five-point scale (1 = slightly/not at all, 5 = extremely) . Positive scale adjectives/items were: interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, and active. Negative scale adjectives/items were: distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, and afraid. The scale has been validated both as a measure of trait and as being sensitive to short term changes in external events (Watson, Clark & Harkness, 1994). In adaption of the PANAS to the context of our study, the participants were asked to rate their volunteer (community or hospital) experience on the same adjectives using the same 5-point response range. As a measure of internal consistency Cronbach's alpha was computed for each scale. The positive affect scale had a Cronbach's alpha of 0.93, and the negative affect scale value was 0.90; indicating that each of these scales had excellent internal consistency. A three item scale on relevance was developed, where participants were asked if they had relevant experiences during their community service or hospital observation experience related to alcohol use or risky driving consequences (0= No, 1 = Yes). Participants completed the arousal and relevance scale about their experience at the hospital or community service placement at the last group session.

Motivational Interviewing Experience (MIE) is a 19 item questionnaire that contains items that correspond to MI specific and general therapeutic skills that participants rated experiencing. Participants rated each item on a Likert type scale with a range from 1 = strongly disagree to 4 = strongly agree. This questionnaire was an extension of a 12-item treatment adherence form used to assess the main components of a MI intervention (McNally, Palfai & Kahler, 2005). The extended version used in this study reflected the specific focus of the MI intervention (e.g., driving and alcohol use). The reliability of the original scale reported as Cronbach's alpha was .71. A principal components analysis with varimax rotation was conducted on these 19 items, and 11 items with a loading of at least .40* were retained to yield one therapeutic experience factor (See Table 1). Responses on this factor were summed, unweighted, to form the MIE score. As a measure of reliability we calculated the Cronbach's alpha for this scale; $\alpha = .77$. Participants completed the MIE after each group meeting, yielding four scores for the MI-H and MI groups and two scores for the CS groups.

High Risk Driving Behaviors Scale (HRD) was developed from the Risky Behavior Questionnaire (RBQ) (Donovan, 1993). We added questions about using cell phones and texting while driving. Participants were asked about how often they had done each of 29

listed behaviors in the past 30 days. Using principal components analysis with varimax rotation, 24 items were retained (with loading of at least .40) and three driving factors were identified: (Factor 1) Speeding and distracted driving (7 items, e.g., driving over the posted speed limit and using cell phone while driving); (Factor 2) Alcohol, drugs and driving (6 items, e.g., driving after 3 or more drinks); (Factor 3) Dangerous driving (11 items, e.g., changing lanes when it was not safe to do so). As a measure of internal consistency Cronbach's alpha was computed for each factor: Factor 1 = .85, Factor 2 = .90, Factor 3 = .90. These values indicate that each factor had very good to excellent internal consistency. The HRD scale was administered at baseline and at the 6-month follow-up.

Driving behavior—At the 6-month follow-up we asked participants questions about their driving experience over the past 6 months since completing the ROAD program: how many months they had a driver's license, how many months they had driven, typical number of days per month driven, and typical number of hours per day of driving.

Data Analysis

Data from the remote secure DatStat® data storage system were imported into SAS 9.3 (Carey SC) for all data analysis. All data were examined for distribution characteristics. Demographic characteristics of the three groups were compared using a χ^2 test for categorical variables. The participant responses to the alcohol severity questions (AUDIT) and the MI experience were summed to give a total score and then analyzed as a continuous variable.

To test the study hypotheses we firstly report on the baseline and 6-month outcome variables for the CS and combined MI groups. We also report in the Tables on the outcome variables across all three groups. For significant difference in outcome variables between the CS and combined MI groups we conducted contrast analysis between all three groups. Analyses of differences between the MI combined and CS groups and between MI groups were conducted using Student T-tests. Where appropriate, ANCOVA models were used to adjust for any significant differences in the baseline measures of the outcome variables. Logarithmic and square root transformations of skewed data were conducted and the most appropriate transformation was selected. Participant police charge event data were summed and analyzed as a continuous variable. Also a logistic regression analysis was conducted using the presence vs. absence of a police charge during the 6-months post program completion period as the dependent variable.

Results

Participants

A total of 990 participants were consented into the study, completed the baseline assessment and were randomized into the three treatment conditions; CS (n = 335; 34.0%), MI (n = 332; 33.5%) and MI-H (n=323; 32.5%). Figure 1 provides information on the recruitment and randomization into the study groups.

Table 2 shows the demographic characteristics of the three groups. Most participants were male (72%), white (89%) and non-Hispanic (95%), and the average age was 18 years. These characteristics do not significantly vary across the three groups. Between the MI and MI-H groups the only significant difference was in race, with more participants in the MI group reporting a race other than white (14% MI, 11% MI-H; $\chi^2(1) = 3.84$; $p = .05$). There were three main categories of the police charge that led to the ROAD referral; a driving related charge (e.g., speeding, dangerous driving), substance related charge (e.g., possession of alcohol by a minor, possession of marijuana) or a charge that was related to both driving and

substance (e.g., driving while intoxicated). As presented in Table 2 the groups did not significantly vary in the proportion of participants referred for these charge types. Also, there were no significant differences between the MI and MI-H groups on type of police referral charge.

Limited data were collected on those participants who were referred by the courts and declined to participate in the research study ($n = 148$). As can be seen from Table 2 participating and non-participating young adults were very similar across the demographic data collected. However, significantly fewer non-participants were white ($Z = -6.03$, $p < .001$), and non-Hispanic ($Z = 2.49$, $p = .01$).

Objective 1: To test the effect of MI in reducing (1) 6-month police charges, (2) 6-month risky driving behavior factors and (3) 6-month hazardous drinking

6-Month Police Charges—Table 3 shows the mean number of pre and post ROAD 6-month police charges across the groups and the proportion of participants in each group who have at least one police charge at 6-month follow-up. A generalized linear model was conducted on differences between the CS and combined MI groups on the mean number of 6-month police charge events, after adjusting for the number of police charges in the six-months before enrolling in ROAD. As seen in Table 3, the CS group was not significantly different at baseline from the combined MI group in the mean number of police charge events, but the CS group had significantly greater mean number of police charge events at the 6-month follow-up compared to the combined MI group ($F(1.989) = 7.49$; $p = .006$).

We conducted a logistic regression analysis to determine differences between the two groups in the probability of having 0 versus > 0 police charge events at the 6-month follow up. We used the CS group as the reference group in this analysis. The combined MI group had a significantly lower odds ratio of having at least one police charge event (CS as reference group: $\beta = -0.40$, Wald's $\chi^2(1) = 7.12$, $p = .006$ odds ratio $e^b = 0.67$ (95% CI = 0.50–0.89); 35% of the CS and 26% of the combined MI group had at least one police charge event.

In examining differences between the three groups in mean 6-month conviction charges, we conducted an ANOVA with contrast effects using Tukey's Studentized range test. The overall model was significant ($F(2, 989) = 4.58$; $p = .01$), and the Tukey's Studentized range test between the groups showed that the MI group had significantly fewer six-month convictions than the CS group ($F = 4.47$; $p = .01$), but the MI-H group convictions were not significantly different than either the CS or MI group. We examined the differences between the three groups in the probability of having at least one police charge event at the 6-month follow up. Using the CS group as the referent group only the MI group had a significant lower probability of having a police charge event ($\beta = -0.53$, Wald's $\chi^2(1) = 8.93$, $p = .003$ odds ratio $e^b = 0.59$ (95% CI = 0.41–0.83). Although there was a trend towards a difference between the CS (as referent group) and the MI-H group, this was not significant ($\beta = -0.30$, Wald's $\chi^2(1) = 2.91$, $p = .09$ odds ratio $e^b = 0.74$ (95% CI = 0.53–1.05).

Risky Driving Behavior Factors—The HRD scale yielded three driving factors. Since the data from the HRD scale for all three-factors were highly skewed, a log + 1 transformation was selected as it yielded scores that most approximated a normal distribution. The transformed three HRD factor scores are shown in Table 4. The smaller sample sizes reported for this analysis reflect the addition of this instrument to the baseline assessment battery after data collection had already commenced.

As no differences were found across the three factors at baseline we did not covary on the baseline scores in this analysis. We assessed differences between the CS and MI combined

groups using a t-test. There were significant differences between these two groups on the speeding and distracted driving factor ($t(607) = -2.32$; $p = .02$) with the CS group reporting significantly less of this behavior, but not on the alcohol, drugs and driving ($t(607) = -0.06$, $p = .95$), or dangerous driving factor scores ($t(607) = -0.21$, $p = .84$). The MI and MI-H groups did not significantly differ on these driving factor scores.

As there were significant differences only in the speeding and distracted driving scale we conducted an ANOVA analysis between the three groups on this driving factor with a follow-up contrast test using the Tukey's Studentized Range test. This analysis showed that the CS group reported significantly less speeding and distracted driving at 6-months than both MI groups ($F(2,604) = 3.73$; $p = .03$), with the overall model and contrast effects between the CS and each MI group significant, but there were no significant difference between the MI and MI-H groups.

Hazardous Drinking—At the baseline assessment hazardous drinking was measured by the AUDIT concerning participant's last 6-months use of alcohol. As presented in Table 5, there was a significant difference between the adjusted mean 6-month AUDIT scores, with the CS group score significantly lower than the combined MI group ($F(1,938) = 5.44$; $p = .02$).

In regard to the comparison of the three groups, since the baseline AUDIT score was significantly greater for the CS group than the MI group only ($F(2,987) = 3.17$; $p = .04$), we conducted an ANCOVA analysis on the 6-month AUDIT score adjusting for this baseline difference. The CS group had an adjusted 6-month AUDIT score that was significantly lower than the combined MI group ($F(2, 936) = 3.45$; $p = .03$), but the MI and MI-H groups were not significantly different from each other.

Driving Time: As driving time can be a significant confound of the effects of group assignment on both convictions and risky driving behaviors we examined the group responses to four driving experience questions asked at the 6-month follow-up assessment (Refer to table 6). The MI combined group had a driving license for significantly longer during the 6 months than the CS group ($t(936) = 2.10$; $p = .04$), and drove more hours in a typical day ($t(838) = 2.37$; $p = .03$). Therefore, the difference in 6-months convictions between the CS and combined MI groups would not be attributable to significantly less driving by the MI groups.

To test the generalizability of the treatment effect across important participant characteristics we ran a series of regression analyses entering age (< 18 or ≥ 18), gender, alcohol severity (baseline AUDIT total score < 4 or ≥ 4), type of referral police charge (traffic vs. substance) as an interaction with group assignment in predicting 6-month police charge events and the three driving factors. There was no significant interaction effects for any of the potential moderators tested.

Mediational model to explain why MI is more effective than CS in reducing 6-month police charges—As there were no superior effects of combined MI reducing 6 month alcohol use or risky driving, we tested a mediational model of the explanatory effects of combined MI on 6 month police charges. Specifically, as fits our theoretical model, we assessed the mediating effects of end of session 1 and 4 MI therapeutic experience score on the increased reduction of police charges of the combined MI group in comparison with the CS group, using the participants' ratings on the Motivational Interviewing Experience form (MIE) (Table 7). We conducted a series of sequential regression analyses assessing the direct effects of group (CS vs. combined MI) and the indirect effect of end of session 1 and 4 MI therapeutic experience on 6-month police charge events (MacKinnon, 2008). See

Figure 2. There were direct effects of group assignment and end of session 1 MI therapeutic experience on 6-month police charge events, with those in the combined MI groups and those who rated greater end of session 1 MI therapeutic experience scores having fewer 6-month police charge events. Also the combined MI group had higher end of session 1 MI therapeutic experience scores. The end of session 1 MI therapeutic experience scores partially mediated the superior effect of the combined MI group having fewer 6-month police charge events compared to the CS group. A Sobel test showed this to be a significant mediation effect ($Z = -2.06$; $p = .04$; 15% of the total effects were mediated and the ratio of the indirect to direct effects was .13). The mediation model that included the indirect effect of end of session 4 MI therapeutic experience on 6-month police event charges was not significant ($Z = -0.78$; $p = .12$).

Objective 2: Test whether exposure to the ED enhanced the effectiveness of MI in reducing 6-month police charges, driving behaviors and hazardous drinking

As presented in Table 3 there were no significant differences between the MI and the MI-H groups in the mean number of police charge events, the probability of having at least 1 police charge event, or in the proportion of participants in each group that did have at least one police charge event at the 6-month follow up. The pattern of no differences between the MI groups also was seen across the driving factor scores and alcohol severity score at the six-month follow up (Tables 4 and 5).

To understand why the hypothesized effect of the MI-H hospital experience increasing the effect of MI on six month driving offense outcomes was not observed, we conducted an analysis on the MI participant's responses to a survey that was given at the end of the group MI and volunteer experience. This included the PANAS to measure the emotional response to either the community service experience or hospital observation experience and questions about the relevancy of either their ED or community service experience.

As hypothesized, the MI-H scored significantly higher on positive arousal (MI-H: Mean = 28.04, SD = 9.40, Range = 10–50; MI: Mean = 24.18, SD = 10.12, Range = 10–50; $t(636) = -4.99$, $p < .001$), but no difference was found for negative arousal (MI-H: Mean = 16.87, SD = 6.90, Range = 10–50; MI: Mean = 16.52, SD = 7.13, Range = 10–50; $t(636) = 0.63$, $p = .53$). The score on the relevance of the experience was also significantly higher in the MI-H group (MI-H: Mean = 0.79, SD = 0.41, Range = 0–1; MI: Mean = 0.11, SD = 0.32, Range = 0–1; $t(636) = 23.16$, $p < .001$). While the hospital experience increased both arousal and relevance as noted earlier it did not improve 6-month outcomes.

Discussion

Our first primary hypothesis was supported: the probability of being charged with an offense within the 6 months post-treatment was significantly less for those participants in the combined MI group than those in the CS group. The combined MI group also had significantly fewer offense events than the CS group. Considering the association between receiving a police charge and serious negative consequences such as MVCs, related injuries and death (Jones & Lacey, 2000; Hingson, Heeren, Winter & Weschler 2011; LexisNexis & RGA Reinsurance Company, 2012) this reduction is an important finding. This difference occurred despite the use of a control that involved an enhanced community program. In this regard the control group included a very structured community service placement and verification and included two didactic/discussion groups that addressed high risk driving.

In our mediational model we found that the level of MI experienced by the MI group participants after the first MI session explained a significant amount of the effect of treatment condition (combined-MI vs. CS) on both the probability of one or more police

charges and the number of police charge events during the six month follow up. The more participants reported experiencing elements of MI the less likely they would have a police charge within the 6 months after the intervention. When we added MI experience in the last session as an additional predictor, the variance explained did not increase, indicating that what the participant experienced in the first session was the mediating factor. Evidently primacy effect is critical to driving group MI effectiveness.

We had anticipated that in order to achieve such a reduction in subsequent police charges participants in the MI groups would have shown a corresponding reduction in high risk driving and high risk alcohol use. However, despite less police charges at 6 months the combined MI group self-reported significantly more hazardous drinking than the control group over the same 6 month period. And in terms of risky driving, the finding was even more perplexing. Despite fewer police charge events at 6 months, the MI participants self reported a significantly greater amount of speeding and distracted driving than the control group. This clearly does not make intuitive sense. Why would the number of police charge events decline in the face of a greater increase in one risky driving factor and an increase in reported alcohol severity? Nirenberg et al (2012) provide data that indicate that court referred young adults who are exposed to an MI intervention are more consistent in reporting their pre treatment alcohol use before and after treatment than are the community service control group. After receiving the MI intervention participants report slightly more baseline alcohol use than they had reported prior to the intervention; whereas participants in the control group reported significantly less pre treatment alcohol consumption at the end of their treatment experience than they had prior to initiating CS. One possible explanation is that as a result of the MI intervention participants continued to discuss these behaviors during their group experience, maintaining the salience of these high risk behaviors throughout the treatment experience. These continuing discussions and clarifications might have led to finer discriminations /sensitivity to what was risky driving behaviors and amount of alcohol consumed (a response shift bias; Howard, 1980; Aiken & West, 1990). In contrast the community experiences of the CS group generally had little to do with a focus on the antecedents and behaviors that led to their offense. Nirenberg et al. suggest a second possible explanation is that in the present study it may be that participants in the MI groups felt more inclined to be more forthcoming regarding their high risk driving and alcohol use behaviors and thusly reported greater frequency of such behaviors than the CS group, whose defensiveness surrounding their illicit and risky behaviors may have led to underreporting. A third explanation is that the MI intervention reinforced high risk behaviors. For example, while not a part of the curriculum, there may have been an iatrogenic effect of a more extensive group discussion of alcohol use and risky driving, in that individuals who received the MI intervention might have learned from others in the group simply how to avoid being stopped by the police while continuing their risky behaviors (e.g., drive more slowly when drinking to avoid a DUI, or speed in an alternate less patrolled location)

To test the generalizability of the relationship between treatment assignment (MI groups vs. CS group) and police charges during the six month follow-up period across our participant population, we tested whether this relationship would be moderated by baseline participant alcohol use, age, gender, or type of offense. No such relationships were found. As there were significant differences between study participants and those who refused study participation, we are unable to determine how MI participation would affect police offenses in a population that was more Hispanic and less Caucasian. An insufficient number of Hispanics in the study sample (CS, 15 Hispanics, MI combined, 32 Hispanics), precluded a reliable test of comparative treatment effect sizes for Hispanic and non-Hispanic participants (Hertzog, 2008).

Our second primary hypothesis that MI-H would be more effective than MI was not supported. Our prior study (Baird et al. 2012) contrasted an earlier version of the MI plus hospital trauma center treatment condition vs. an enhanced prototypic community service and found no significant differences in driving offenses, alcohol use or risky driving behaviors. The present study compared an enhanced MI-H exposure condition with prototypic CS. We also expanded the study to a three group design in order to separate the effects of the MI enhanced hospital trauma center condition from those of MI alone. The design of the present study was structured so that study participants would have up to three general sources of information to draw upon including: 1) the participants own experiences (CS, MI and MI-H), 2) information about the experiences of other group members (MI and MI-H only), and 3) the experiences associated with the trauma center experience (MI-H only). We expected that additional exposure to negative consequences of dangerous driving and substance abuse, as seen in the hospital trauma center, would enhance the effectiveness of the MI. We hypothesized that the trauma center exposure would increase participant's arousal regarding observation of consequences pertinent to their own offenses. This experience, coupled with the techniques of MI directed at enabling the participant to make direct and relevant connections between the vicarious trauma center experiences and risky driving and drinking would increase MI effectiveness. Contrary to our hypothesis, exposure to the hospital trauma center did not increase the effectiveness of MI in reducing police charges. Consistent with our earlier study MIH alone was not significantly better in reducing police charges than was CS. In contrast, MI alone was significantly better than CS.

Despite the lack of incremental effectiveness for MI-H, post-community session ratings did indicate that, as hypothesized, the hospital experience was rated as more arousing and more relevant than community service to MI participants. Moreover, further analysis revealed that not only did MI-H increase positive arousal more than MI alone, positive arousal itself was a significant predictor of reduced police charges ($\beta = -.08$, $p=.05$). Thus, the evidence for our rationale for inclusion of the ED component is consistent with the hypothesis that MI-H should be more effective than MI-alone. These findings are problematic both for our theoretical explanation as to how and why these interventions work, and for the observation that when compared to CS, MI-H is less effective than MI alone in reducing court offenses. This discrepancy draws our focus to the totality of the trauma experience. The overall failure of MI-H to produce fewer convictions than MI-alone, despite support for the mechanism hypothesized to yield better outcomes, suggests that other factors operative in the ED experience may be more important in determining outcomes. One line of thought is as follows: Participants were mentored during the ED experience by emergency medical technicians. These technicians made sure that participants observed the ongoing effects of trauma in the ED and were directed to clearly delineate the connection between the ED patient's high risk behavior and the resulting trauma. In general the experience was directive and at times became confrontational when participants informally communicated with other ED staff members. It is possible that since this ED experience was so different from the MI counseling approach that was utilized in the MI group sessions it may have been counter-productive. The ED exposure might be similar to the experiences of participants in other studies that intentionally create a fear based experience. Such programs that utilize a fear based program have been generally ineffective and in some studies have been found to have a damaging effect (Brown and Locker, 2009). The ED experience may have unintentionally created defensiveness and in doing so, resistance to change. This may have cancelled out the potentially synergistic effect of the ED experience on the group MI experience. We therefore speculate that presenting the ED experience in a motivational counseling style and in a less fearful manner might produce the expected amplification of the ED trauma room experience on MI effectiveness.

In summary, the finding that the MI intervention led to a reduction in future convictions at 6 months is encouraging. In this regard the mechanism of change analysis highlights the importance of MI in this change process. The failure of the hospital ED component to enhance this effectiveness, despite support for hypothesized underlying mechanisms for doing so requires further investigation. Moreover, the anticipated decrease in self reported high risk driving and hazardous drinking was not found; and in fact the MI group participants actually reported increases in such behaviors. This discrepancy in outcomes also needs to be examined further. Since participants were limited to court referred young adults and those who agreed to participate in the study, future research will be necessary to generalize the results to non-court referred participants and other age groups. Overall, a conviction may provide a valuable teachable moment to reduce future convictions by offering offenders an intervention.

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Highlights

Court referred youth were randomized to motivational counseling or community service

Outcome data on court data and self report were collected on over 95% of participants

Based on randomized controlled trial, legal offenses were less for youth receiving motivational counseling

Mediation analyses revealed outcome was partially accounted for by the motivational counseling experience

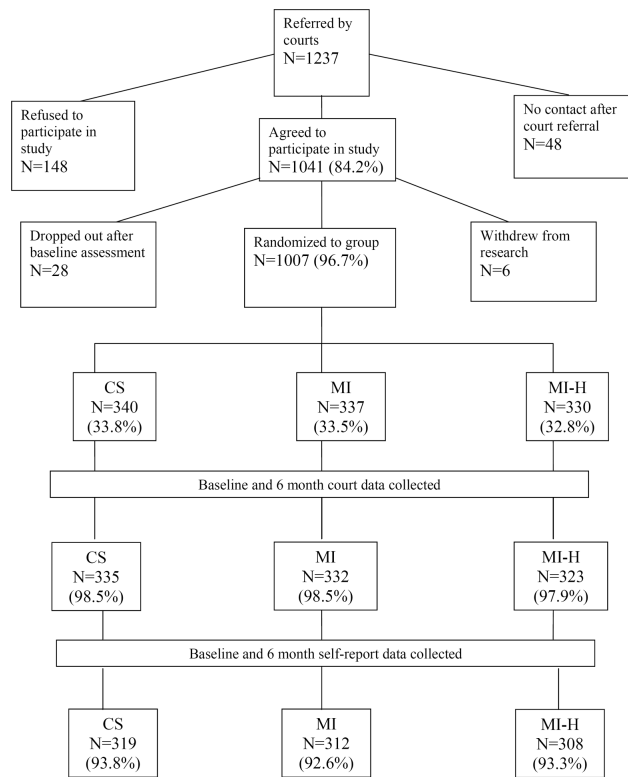


Figure 1.
CONSORT Diagram

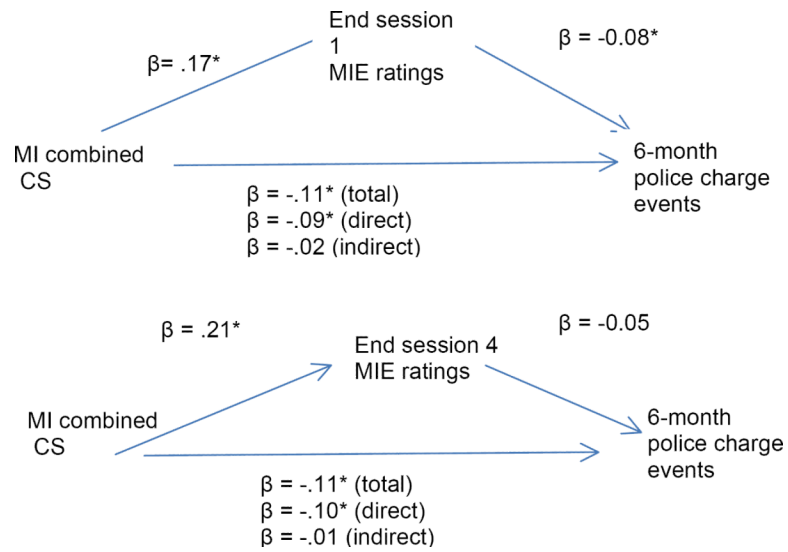


Figure 2.
Mediation models

Table 1

Motivational Interviewing Experience (MIE) items

Item	Factor Loadings
The counselor was easy to talk to	0.69
The counselor was concerned about me	0.64
The counselor understood me	0.78
The counselor helped me to talk about my reasons for wanting to change	0.48
The counselor helped me to talk about my own reasons for not wanting to change	0.63
The counselor treated me like an equal	0.67
The counselor respected my ideas about how to change	0.80
The counselor accepted that I might choose not to change	0.64
The counselor tried to convince me that I was wrong (reversed score)	-0.26*
The counselor helped me to think about some things in a new way	0.68
The counselor warned me about the bad things that would happen to me if I didn't change (reversed score)	-0.48

* Note: Item 9 had a factor loading of < .40, but was retained because of the important MI inconsistent behavior represented.

Table 2

Demographic characteristics of participants across groups

Variable	CS (n = 335)	MI (n = 332)	MI-H (n=323)	Non-participants (n =148)
Gender	Male = 71.9%	Male = 73.8%	Male = 70.0%	Male = 70%
Age (yrs)	Mean = 18.0 SD= 1.26	Mean = 18.1 SD= 1.34	Mean = 18.03 SD= 1.28	Mean = 18. 3 SD= 1.29
Race/Ethnicity				
White	89%	86%	91%	70%
Hispanic	4.5%	5.4%	5.0%	10%
Referral police charge				
1. Driving	42.4%	38.3%	45.8%	42.2%
2. Substance	48.4%	55.1%	46.1%	43.2%
3. Driving and substance	9.3%	6.6%	8.1%	8.8%

Table 3

Police charge data

Variable	CS (n = 335)	MI (n = 332)	MI-H (n = 323)	Combined MI (n = 655)
Mean number of past 6-month pre ROAD police charge events	Mean = 1.10	Mean = 1.08	Mean = 1.09	Mean = 1.09
	SD = 0.30	SD = 0.27	SD = 0.30	SD = 0.27
	Range = 1–2	Range = 1–2	Range = 1–2	Range = 1–2
Mean number of 6-month post ROAD police charge events (Adjusted for pre ROAD police charge events)	Mean = 0.37	Mean = 0.26	Mean = 0.31	Mean = 0.28
	SD = 0.53	SD = 0.46	SD = 0.51	SD = 0.49
	Range 0–2	Range 0–2	Range 0–2	Range 0–2
% with > 0 post ROAD 6-month police charge events	35%	25%	28%	26.5%

Table 4

Risky driving factor scores

Variable	CS (n = 267)	MI (n = 233)	MI-H (n = 235)	Combined MI (n = 468)
1. Speeding and distracted driving	Mean = 3.01	Mean = 2.83	Mean = 3.06	Mean = 2.95
	SD = 1.65	SD = 1.62	SD = 1.53	SD = 1.10
*Baseline	Range = 0–5.30	Range = 0–5.28	Range = 0–5.24	Range = 0–5.28
*6-months	Mean = 2.49	Mean = 2.69	Mean = 2.91	Mean = 2.81
	SD = 1.57	SD = 1.56	SD = 1.50	SD = 1.53
	Range = 0–5.35	Range = 0–5.08	Range = 0–5.07	Range = 0–5.08
2. Alcohol, drugs and driving	Mean = 0.69	Mean = 0.56	Mean = 0.60	Mean = 0.58
	SD = 1.14	SD = 1.16	SD = 1.04	SD = 1.10
*Baseline	Range = 0–4.69	Range = 0–4.96	Range = 0–4.69	Range = 0–4.96
*6-months	Mean = 0.58	Mean = 0.61	Mean = 0.59	Mean = 0.60
	SD = 1.14	SD = 1.15	SD = 1.13	SD = 1.14
	Range = 0–4.39	Range = 0–4.70	Range = 0–4.84	Range = 0–4.84
3. Dangerous driving	Mean = 1.58	Mean = 1.29	Mean = 1.54	Mean = 1.42
	SD = 1.45	SD = 1.44	SD = 1.39	SD = 1.30
*Baseline	Range = 0–5.10	Range = 0–5.44	Range = 0–5.20	Range = 0–5.44
*6-months	Mean = 1.39	Mean = 1.23	Mean = 1.44	Mean = 1.34
	SD = 1.46	SD = 1.35	SD = 1.41	SD = 1.39
	Range = 0–5.71	Range = 0–5.32	Range = 0–5.34	Range = 0–5.34

* Log+1 transformed scores

Table 5

AUDIT scores

Variable	CS (n = 335)	MI (n = 332)	MI-H (n = 323)	Combined MI (n = 655)
	M = 6.83	M = 6.20	M = 5.88	M = 6.05
Baseline AUDIT	SD = 6.11	SD = 5.94	SD = 5.28	SD = 5.62
	Range = 0–30	Range = 0–34	Range = 0–30	Range = 0–34
6-month AUDIT [/]	M = 5.86	M = 6.54	M = 6.30	M = 6.42
	SD = 4.29	SD = 5.78	SD = 5.25	SD = 4.24
	Range = 0–30	Range = 0–34	Range = 0–23	Range = 0–34

[/] Adjusting for baseline AUDIT score significant difference

Table 6

Group driving experience

Experience	CS (n=318)	MI (n=312)	MI-H (n=308)	Combined MI (n = 620)
For how many months in the past 6 months have you had a driver's license	Mean = 4.99 (SD =2.09) Range = 0–6	Mean = 5.30 (SD =1.78) Range = 0–6	Mean = 5.25 (SD =1.86) Range = 0–6	Mean=5.28 (SD =1.82) Range = 0–6
How many months did you drive in the past 6-months?	Mean = 4.84 (SD =2.21) Range 0–6	Mean = 5.16 (SD =1.93) Range 0–6	Mean = 5.04 (SD =2.02) Range 0–6	Mean = 5.10 (SD =1.98) Range 0–6
How many days did you typically drive in a month?	Mean = 21.75 (SD =10.53) Range 0–30	Mean = 23.18 (SD =9.74) Range 0–30	Mean = 22.73 (SD =9.89) Range 0–30	Mean = 22.95 (SD =9.81) Range 0–30
How many hours did you typically drive in a day?	Mean = 1.97 (SD =1.52) Range 0–10	Mean = 2.18 (SD =2.17) Range 0–20	Mean = 2.44 (SD =2.99) Range 0–24	Mean = 2.31 (SD =2.61) Range 0–24

Table 7

Group Motivational Interviewing Experience (MIE) Session Ratings

Session	CS (n = 330)	MI (n = 324)	MI-H (n = 321)	Combined MI (n = 645)
Session 1 MI therapeutic experience score	M = 34.11 SD= 4.67	M = 35.95 SD= 5.11	M = 36.44 SD= 4.45	M = 36.19 SD= 4.88
Session 4 MI therapeutic experience score	M = 33.84 SD= 5.5	M = 36.57 SD= 5.53	M = 37.07 SD= 5.04	M = 36.80 SD= 5.31