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Abstract

Objective: Law enforcement officers often encounter alcohol-intoxicated suspects, suggesting that many suspects are presented with the challenge of grasping the meaning and significance of their *Miranda* rights while intoxicated. Such comprehension is crucial, given that *Miranda* is intended to minimize the likelihood of coercive interrogations resulting in self-incrimination and protect suspects' constitutional rights. Yet, the effects of alcohol on individuals' ability to understand and appreciate their *Miranda* rights remain unknown—a gap that the present study sought to address. **Hypothesis:** Informed by alcohol myopia theory (AMT), we predicted that intoxicated individuals would demonstrate impaired *Miranda* comprehension compared to sober individuals and those who believed they were intoxicated (but were in fact not; i.e., placebo participants). **Method:** After health screenings, participants completed the Wechsler Abbreviated Scale of Intelligence–Second Edition verbal subtests, rendering a Verbal Comprehension Index (VCI) score. We randomly assigned participants to consume alcohol (n = 51; mean breath alcohol concentration [BrAC] = 0.07%), a placebo condition (n = 44; BrAC = 0.00%), or a sober control condition (n = 41; BrAC = 0.00%). All participants (N = 136) completed the *Miranda* Rights Comprehension Instruments (MRCI), which measured participants' understanding of the *Miranda* warnings, recognition of the warnings, appreciation of their rights in interrogation and court settings, and understanding of *Miranda*-related vocabulary. **Results:** We found a significant effect of intoxication condition on participants' understanding of *Miranda* warnings (η_p^2 = .14) and *Miranda*-related vocabulary (η_p^2 = .05) when controlling for VCI scores. Specifically, intoxicated participants received lower scores for understanding of warnings compared to sober and placebo participants, and lower scores for understanding of *Miranda* vocabulary compared to sober participants. Alcohol did not significantly impact *Miranda* rights

recognition or appreciation. **Conclusions:** Alcohol intoxication may detrimentally impact some facets of *Miranda* comprehension. Thus, it is important that law enforcement consider refraining from questioning intoxicated suspects.

Keywords: Miranda rights, alcohol intoxication, interrogation, suspects, alcohol, *Miranda*

Public Significance Statement

Alcohol-intoxicated suspects are often presumed capable of knowingly and intelligently waiving their *Miranda* rights. Our experimental findings, however, demonstrate that some aspects of individuals' understanding of their rights suffer as a function of alcohol intoxication. Specifically, participants' ability to verbalize the meaning of their rights, as well as the meaning of *Miranda*-specific vocabulary, appeared to suffer as a function of intoxication. Thus, as more research on this topic accumulates, law enforcement should consider waiting for intoxicated individuals to "sober up" before seeking to commence questioning.

The Detrimental Impact of Alcohol Intoxication on Facets of *Miranda* Comprehension

In 2006, Travis Jewell was arrested after he flipped his truck while fleeing a police officer. According to the judge's written opinion in the case, during the arrest, the officer read Jewell his *Miranda* rights (i.e., individuals' constitutional rights pertaining to silence and counsel that U.S. police are mandated to relay prior to questioning). Jewell closely listened to, and explicitly indicated understanding of, his *Miranda* rights. Jewell proceeded to make several incriminating admissions. The arresting officer later testified that Jewell had demonstrated signs of intoxication (i.e., bloodshot eyes, strongly smelling of alcohol, slurring words, swaying, and having difficulties standing) and that Jewell's blood alcohol level was 0.291 (0.08 is the federal legal driving limit in the United States). The trial court suppressed Jewell's admissions, stating that Jewell "could not have acted knowingly or intelligently when he waived his rights." The trial court's decision was later overturned on appeal, with the deciding judge ruling that Jewell was "lucid and rational when he waived his right to remain silent." Thus, it was decided that Jewell's intoxication level did not render him incapable of knowingly and intelligently waiving his Miranda rights (*People v. Jewell*, 2008).

The aforementioned case highlights the legal assumption that intoxicated suspects have the capacity to knowingly and intelligently waive their rights (see also *State v. Keith*, 1993). To the best of our knowledge, however, there is no empirical evidence that directly supports or refutes this assumption. Therefore, the goal of the present study was to understand the impact of alcohol intoxication on individuals' abilities to comprehend their *Miranda* rights. We accomplished this goal by employing controlled, lab-based experimental methods and a validated psychometric measure of *Miranda* comprehension (Miranda Rights Comprehension Instruments [MRCI]; Goldstein et al., 2014). By using the MRCI, our data were able to attest to alcohol

intoxication's effect on *Miranda* understanding (i.e., ability to interpret the meaning of one's rights, as measured by the Comprehension of Miranda Rights-II [CMR-II], Comprehension of Miranda Vocabulary-II [CMV-II], and Comprehension of Miranda Rights-Recognition-II [CMR-R-II] instruments) and appreciation (i.e., recognizing what consequences one might face as a function of waiving one's rights, as measured by the Function of Rights in Interrogation [FRI] instrument).

Prevalence of Intoxicated Suspects

The prevalence with which law enforcement interacts with alcohol-intoxicated suspects emphasizes the importance of studying the effect of intoxication on suspects' *Miranda* rights comprehension. Alcohol has been linked to more than half of the U.S. prison population (i.e., inmates were intoxicated at the time of the crime, had an alcohol treatment history, or had an alcohol use disorder; National Center on Addiction and Substance Abuse at Columbia University, 2010). It is therefore not surprising that police officers report regularly coming into contact with intoxicated suspects (Evans et al., 2009); of note, this finding is not unique to U.S. law enforcement (Hagsand et al., 2022). Yet intoxicated suspects may be treated no differently from their sober counterparts—the majority of Evans and colleagues' (2009) survey respondents revealed that their police departments implement the same protocols with intoxicated and sober suspects. Of note, about a quarter of these law enforcement respondents indicated that they believed suspects are more likely to waive their *Miranda* rights when they are intoxicated versus sober (nearly 50% of respondents indicated that intoxicated suspects are just as likely to waive as are sober suspects, and 10% indicated that intoxicated suspects were less likely than sober suspects to waive their rights; the remaining respondents did not respond).

Implementing similar *Miranda* and interrogation protocols for intoxicated and sober suspects would be acceptable if we presume that intoxicated suspects have the capacity to intelligently waive their rights—an assumption that has been made by the courts (e.g., *People v. Jewell*, 2008). To date, however, there is no empirical evidence to speak to the accuracy of this assumption, although there is research on whether sober individuals understand their *Miranda* rights.

Do Individuals Understand Their Rights?

The 1966 *Miranda v. Arizona* ruling dictated that a suspect's statements would be admissible in court only if the suspect "knowingly, intelligently, and voluntarily" waived their rights to silence and to an attorney. The court's intention was for *Miranda* to protect the integrity of suspects' constitutional rights and reduce the likelihood that suspects would make incriminating statements as a result of coercive interrogation tactics; however, subsequent psychological research has demonstrated that *Miranda* may not fully serve its protective duties as the court intended. As Smalarz and colleagues (2016) noted, the court assumed that *knowing* one's rights equates to *comprehending* one's rights—an assumption that *Miranda* comprehension research undermines.

Although adults may earn high scores on *Miranda* comprehension measures (e.g., Everington & Fulero, 1999), their understanding is often incomplete and fraught with misconceptions. For instance, about one-third of a sample of college students and defendants believed that invoking their "right to remain silent" would be incriminating (Rogers et al., 2010), and nearly one-third of a sample of community members believed that after requesting an attorney, questioning could continue until the attorney was physically present (Rogers et al.,

2013; see also Grisso, 1998). Furthermore, individuals believe that guilty suspects are *more* likely to invoke their rights than are innocent suspects (Mindthoff et al., 2018).

Beyond the "knowingly, intelligently, and voluntarily" requirement, the *Miranda* court also stated that suspects should demonstrate "an awareness of [the] consequences" incurred by waiving their rights—an awareness that many individuals lack. For example, only a little more than 50% of 80 pretrial defendants were cognizant of the long-term consequences associated with waiving their rights (Blackwood et al., 2015). As the authors noted, this was the case despite one of the *Miranda* warnings explicitly addressing that fact that suspects' statements can and will be used against them. Overall, the aforementioned findings seemingly support Smalarz and colleagues' (2016) summary of *Miranda*'s impact: "*Miranda* may function to perpetuate an erroneous belief that one has nothing to gain—and potentially something to lose—by invoking these rights" (p. 457).

Particularly concerning is that vulnerable populations are at heightened risk of failing to knowingly and intelligently waive their rights. Several studies have examined *Miranda* understanding and appreciation with samples of adolescents (e.g., Goldstein et al., 2003; Redlich et al., 2003; Viljoen et al., 2007; Zelle et al., 2015) and individuals with intellectual and/or mental disability (e.g., Cooper & Zapf, 2008; Erickson et al., 2020; Everington & Fulero, 1999). Results suggest that individuals from these special populations do not have a complete grasp of their *Miranda* rights. Such findings are particularly troubling because adolescence and intellectual/mental disabilities constitute dispositional risk factors for false confessions in coercive interrogation settings (see Kassin et al., 2010, for a review)—settings in which *Miranda* is seemingly inadequate at protecting these vulnerable populations.

Alcohol Intoxication and *Miranda*

Although past *Miranda* research has illuminated the notion that many individuals simply do not fully understand and appreciate their constitutional rights, there remains a gap in the literature—namely, what impacts alcohol intoxication may have on *Miranda* rights comprehension. Alcohol intoxication may hinder *Miranda* comprehension as a result of its deleterious effects on working memory mechanisms. Specifically, alcohol intoxication may reduce not the amount, but instead the type, of information that can be attended to, thus detrimentally affecting attention allocation (Saults et al., 2007). This notion is supported by findings showing that alcohol intoxication leads to increased disengagement in sustained attention tasks (Finnigan et al., 2007) and increased mind wandering while reading classic literature (i.e., Tolstoy's *War and Peace*; Sayette et al., 2009; but also see Harvey & Beaman, 2021, who found no impact of moderate levels of alcohol intoxication on the "cocktail party effect"). Intoxicated suspects, therefore, might have pronounced difficulty focusing attention on comprehending rights as they are presented to them. This may be particularly likely in the case of *Miranda* rights, given that *Miranda* warnings can be very complex in some jurisdictions, with one study finding that warnings varied from elementary to postgraduate reading levels (Rogers et al., 2007).

Relatedly, Steele and Joseph's (1990) alcohol myopia theory (AMT; see also Giancola et al., 2010, and Mocaiber et al., 2011, for reviews) suggests that alcohol reduces the capacity for cognitive processing, thereby limiting attentional resources and restricting the number of cues that intoxicated individuals are capable of attending to. Thus, intoxicated individuals may attend mostly to salient cues in their environment, which may include distractions that stem from internal cognitions (i.e., thoughts and/or feelings). Indeed, alcohol intoxication has been shown to decrease the suppression of irrelevant information as a function of impairments to attentional

inhibition (but only during blood alcohol curve ascension; Fillmore et al., 2000)—intoxicated individuals may not be fully capable of controlling what to *not* pay attention to (Fillmore, 2007).

Applying this to intoxicated suspects, intoxication may impede *Miranda* comprehension because individuals are more likely to be preoccupied with environmental distractions (e.g., loud noises) and internal cognitions (e.g., stress of being questioned by law enforcement, focus on being polite to officers, worry about potential imprisonment) at the time of waiver and during questioning. Such salient distractions may monopolize intoxicated individuals' already-limited cognitive resources, thereby leaving few resources to effectively process the meaning and implications of their rights. Alcohol intoxication can be of further detriment to appreciating one's rights because reductions in attentional resources can limit one's ability to consider future consequences, as attention is dedicated to the most immediate consequences (Giancola et al., 2010). Intoxicated individuals may therefore be less able to appreciate the long-term implications of waiving their rights, seeing only the potential, immediate benefit of talking themselves back to freedom during police questioning.

The Present Study and Hypotheses

We sought to examine the effects of alcohol intoxication on *Miranda* comprehension—a topic for which, to the best of our knowledge, no empirical evidence exists. This is a pressing concern, given that police frequently come into contact with intoxicated suspects. To address this topic, we manipulated participants' intoxication levels in a lab and tested their *Miranda* comprehension (i.e., understanding and appreciation) using an established, standardized tool. Additionally, we made the a priori decision to account for participants' verbal capabilities (using the Verbal Comprehension Index [VCI] score from the Wechsler Abbreviated Scale of Intelligence—Second Edition; Wechsler, 2011) when assessing *Miranda* comprehension, given

that comprehension has been demonstrated to correlate with measures of verbal intelligence (e.g., Colwell et al., 2005). On the basis of AMT, we hypothesized that intoxicated individuals would demonstrate lower comprehension of their rights than sober individuals, as measured by performance on the MRCI components of understanding (CMR-II; CMV-II), recognition (CMR-R-II), and appreciation (FRI), controlling for verbal capabilities.

Additionally, to examine whether any findings could be explained by psychological expectancy effects and to buttress experimental control, we included a placebo group. Including a placebo condition in lab-based research on alcohol's effects on cognitive processes is important, because it can help researchers determine whether the expectation of drinking alcohol alone can affect performance beyond the intoxicating effects of alcohol (Schlauch et al., 2010; see also Schreiber Compo et al., 2011, for findings in line with the "hypervigilance hypothesis"). Because AMT would suggest that placebo participants have sufficient cognitive resources to engage in effortful processing of the meaning and implications of their rights, we did not hypothesize that placebo participants and sober control participants would differ in terms of comprehension (i.e., MRCI scores, when controlling for verbal capabilities). Indeed, prior research has suggested that the expectation of consuming alcohol may not have a negative impact on attention allocation (e.g., Fillmore et al., 2000).

Method

Participants

One hundred thirty-eight student participants recruited from Florida International University, a large public university, passed all screening measures (see Table S1 in the supplemental material) and completed a verbal intelligence measure, the full experimental procedures, and the MRCI. If they completed the entire study, participants received their choice

of either $50 or the number of research participation credits equivalent to the number of hours spent participating. Note that we added an additional participation incentive once the study had already started running (i.e., to improve slow recruitment rates, we offered later participants who selected the cash compensation a $20 Amazon gift card in addition to the $50).

We excluded data from two participants (one because of human error in data management, the other because of experimenter failure to properly administer the verbal intelligence measure). A sensitivity analysis indicated that our final sample size of 136 yielded 80% power to detect an effect (*f*) greater than 0.27, 90% power to detect an effect greater than 0.31, and 95% power to detect an effect greater than 0.34 ($\alpha = .05$) for our primary hypothesis using a one-way analysis of covariance (ANCOVA) with one covariate (Faul et al., 2007).

Of the final 136 participants (56.6% female, 43.4% male) included in this study, the mean age was 23 years (*SD* = 4; *Mdn* = 22). Consistent with student body demographics, most participants were Hispanic (65.4%; 13.2% White; 12.5% Black/African American; 4.4% Asian; 4.4% other). More than two-thirds of participants indicated that they were bilingual (68.4%), and of the 55 participants who indicated speaking English as a second language, only one participant indicated being nonbilingual. Among the 121 participants who reported their academic major, psychology was most common (49.6%).

Design

We randomly assigned participants to one of three conditions in a three-cell design using a random number generator: intoxicated (target breath alcohol concentration [BrAC] = 0.06–0.08%, which was the highest we could ethically achieve in the lab given our study's procedures; *n* = 51), placebo (target BrAC = 0.01–0.02%, with participants believing that they consumed a full dose; *n* = 44), or sober (target BrAC = 0.00%, with no alcohol consumed; *n* = 41). Note that

we used an active placebo condition**.** In a traditional placebo condition, participants are under the impression that they are receiving the full dose of alcohol but in fact receive none. In contrast, in our active placebo condition, participants received a small amount of alcohol to improve gustatory and olfactory believability. This active placebo approach has been used successfully in past alcohol administration research to improve believability of the placebo condition (e.g., Ham et al., 2011; MacDonald et al., 2000; Mindthoff et al., 2019; Schreiber Compo et al., 2012, 2017).

Materials

The present study was part of a larger study in which we administered measures to address multiple research questions within a single session with each participant, given the complexities and potential for risk to participants involved in working with intoxicated participants in a lab setting. To provide readers with context, we only briefly describe measures and procedures that were not relevant to the present research objectives. These additional measures and procedures, all of which were implemented before MRCI administration, included the following: Brief Self-Control Scale (Tangney et al., 2004); consideration of future consequences scale (Strathman et al., 1994); a vignette task designed to measure aggressive tendencies; the Gudjonsson Suggestibility Scale (Gudjonsson, 1984; note that our findings from this scale are published elsewhere; Mindthoff et al., 2021); Russano et al.'s (2005) cheating paradigm; and a cheating paradigm postquestionnaire. Of note, the cheating paradigm involved deception (i.e., a confederate either prompted or did not prompt participants to cheat; a research assistant later accused all participants of cheating and then questioned them), for which participants were fully debriefed before being administered the MRCI. Also important to note is that the experimenter did not tell participants their intoxication status during this initial deception

debriefing; hence, participants were blind to their intoxication condition during the MRCI. All analyses in the present manuscript are original, with the exception of some BrAC measurements and demographic data.

Miranda Rights Comprehension Instruments

The MRCI (Goldstein et al., 2014) consists of four instruments (see Table 1) and has been shown to be a reliable and valid tool. The first instrument, CMR-II, includes five open-ended response questions probing participants' understanding of *Miranda* warnings. Specifically, the administrator asks participants to describe each warning (e.g., "You have the right to remain silent," "Anything you say can be used against you in court") in their own words (these rights are also visually presented in written form to participants as the administrator verbalizes them). The second instrument, CMR-R-II, presents participants with the same five *Miranda* warnings used in the CMR-II. For each warning, the administrator reads three sentences (while simultaneously presenting them in written form), and participants must decide whether the meaning of each sentence is the same as or different from the *Miranda* warning. For example, participants have to decide whether "You should not say anything until the police ask you questions" has the same meaning as the warning "You have the right to remain silent."

The third instrument, FRI, comprises 15 open-ended response questions pertaining to four different scenarios. The administrator presents participants with a drawing of each scenario, accompanied by a verbal description (e.g., a picture of a suspect meeting with his lawyer before questioning at a police station, with a printed caption). Together, the 15 FRI items are designed to measure whether participants appreciate the importance of *Miranda* warnings in interrogation and legal proceeding settings. The items are divided into three subscales that assess participants' appreciation of the adversarial nature of an interrogation (Nature of Interrogation subscale), the

function of an attorney (Right to Counsel subscale), and the right to silence (Right to Silence subscale). In the fourth instrument, CMV-II, the administrator presents participants with 16 terms (both verbally and in written form) commonly used in *Miranda* warnings (e.g., *consult*, *attorney*) and asks participants to describe the meaning of each term in their own words.

Scoring. The rules for scoring responses were developed by legal and psychological experts (Goldstein et al., 2003) and are detailed in the MRCI manual. Specifically, scorers award participants' responses to each CMR-II, FRI, and CMV-II item 0, 1, or 2 points. These scores represent responses that are *inadequate*, *questionable*, or *adequate*, respectively. Responses to the CMR-R-II items are scored for accuracy, and scorers award each response either a 0 (incorrect) or 1 (correct). The total score range for each of the MRCI instruments is as follows: CMR-II = 0–10, CMR-R-II = 0–15, FRI = 0–30 (with the maximum score for each subscale being 10 points), and CMV-II = 0–32.

Test administrators scored participant responses "live," in line with scoring guidelines; however, we used the third author's rescoring of the three relevant MRCI instrument scores (which were based on the verbatim transcriptions of participants' responses) for our analyses (note that the CMR-R-II does not require subjective scoring—answers are either correct or incorrect). We made the a priori decision to rely on the third author's scores because the author was blind to intoxication condition, whereas the test administrators were not (although test administrators were blind to the study's hypotheses). There were, however, a handful of cases in which, because of experimenter error, the test administrator did not record their live scores or in which the third author administered the MRCI (while being blind to intoxication condition)—for these reasons, a small percentage of participants' responses were scored only by the author. Intraclass correlation coefficients (ICCs) between test administrators' scores and the third

author's scores (computed using a one-way random-effects model with measures of absolute agreement; average measures reported; Hallgren, 2012) were as follows: CMR-II = .86 (n = 134); FRI = .83 (n = 130); CMV-II = .84 for (n = 130). Post hoc analyses for our primary outcome variables using the test administrators' scores demonstrated a pattern of results similar to when we used the third author's scores (albeit some scores did not reach statistical significance upon examination of p values; see Table S2 in the supplemental material).

Wechsler Abbreviated Scale of Intelligence—Second Edition

The WASI-II measures cognitive capabilities and intelligence (Wechsler, 2011). Because the WASI-II verbal subtests correlated with *Miranda* understanding and appreciation in previous research (e.g., Colwell et al., 2005), we administered the Vocabulary and Similarities subtests of the WASI-II in the present study. Participants' VCI scores were based on their performance (a) defining a set of progressively complex terms (Vocabulary subtest) and (b) identifying commonalities between terms in word pairs, again with progressing difficulty (Similarities subtest). We used these VCI scores as a covariate in our main analyses.

Scoring. We conducted all scoring in line with the official WASI-II scoring manual. Specifically, we assigned responses to each Vocabulary and Similarity item a score of 0, 1, or 2, with higher scores indicating better performance. We calculated raw total scores for Vocabulary items and for Similarity items and then translated raw scores into T scores. We summed these T scores to generate a verbal comprehension score to determine participants' VCI scores.

Per standard WASI-II protocol, trained research assistants scored participants' responses while administering the WASI-II (note that all test administrators were blind to the study's hypotheses). Another trained research assistant or senior researchers (i.e., one of the authors) later scored all responses a second time to ensure that test administrators properly implemented

scoring protocols. We used the original test administrators' VCI scores in all analyses because (a) the ICC for test administrators' and test reviewers' VCI scores indicated excellent reliability (ICC = .91; computed using a one-way random-effects model with measures of absolute agreement; average measures reported; Koo & Li, 2016) and (b) the pattern of results was the same regardless of whether we used test administrators' or test reviewers' VCI scores. Of note, unlike with the MRCI, all participants were sober at the time the WASI-II was administered, and no experimental manipulations had been implemented.

Procedure

All procedures were approved by Florida International University's Institutional Review Board (Approval #IRB-14-0002). Student participants responded to flyers posted around a large public university campus or signed up to participate via the psychology department's online participant recruitment system. Study advertisements were purposely kept vague, indicating that the study examined the impact of alcohol on cognitive processing. Interested participants went through a brief phone screening process to determine initial eligibility, which involved responding to questions that assessed (a) their willingness to participate (e.g., comfort with drinking alcohol), (b) medical safety (e.g., not regularly taking prescription medication), (c) and legal requirement (e.g., 21 years or older; see Table S1 in the supplemental material for the complete list of screening criteria). Those who passed the phone screening were scheduled for a full session.

Upon arrival at the lab, potential participants (N = 329) asked any questions they had and read and signed a consent form. Next, participants began a detailed medical screening, which served as the final eligibility screening phase. (The medical screening was a more comprehensive version of the initial phone screening, addressing eligibility in terms of medical safety, including

medical conditions, medication, and drinking behavior; see Table S1 in the supplemental material for screening criteria.) A research assistant measured the height, weight, and baseline BrAC of the 179 participants who passed the screening. We did not collect MRCI outcome data for all 179 participants because a trained MRCI administrator was not present at some sessions and some participants/experimenters terminated the session early because they had adverse reactions to alcohol, discovered that the participant had falsified responses on the medical screening questionnaire, or became upset during the unrelated interrogation manipulation). Research assistants used either an Intoxilyzer 5000 or a breathalyzer (BACtrack S80 professional breathalyzer; KHN Solutions, 2016) to take all BrAC measurements. Next, the research assistant administered several measures, including a demographic information sheet, the WASI-II, and two other brief, unrelated measures, then escorted participants to our lab's simulated bar.

Drinking Phase

At the bar, participants met a confederate, who they were led to believe was another participant (for purposes of the cheating paradigm only), and a research assistant (referred to here as the bartender; note that several research assistants, both male and female and of different ethnicities, assumed the confederate and bartender roles over the course of the study). The bartender prepared and served participants three beverages, which contained liquid consistent with their randomly assigned condition, with a lime slice on the rim of each glass. Participants in the sober condition consumed three glasses of orange juice after being informed that their drinks contained no alcohol. Participants in the alcohol condition consumed three glasses of vodka and orange juice after being informed that they were in the alcohol condition. The bartender determined the dose of vodka via participants' sex and weight, with males receiving a higher dose than females of the same weight (2.82 ml vs. 2.35 ml of 80 proof vodka per kilogram of

body weight, respectively; MacDonald et al., 2000). For participants who were overweight, as determined by their body mass index, the bartender used the Hamwi formula (Hamwi, 1964) to determine participants' ideal weight, which was then used to determine their dose. We used this process, which has been employed in past alcohol administration research (e.g., Evans et al., 2019), to minimize the occurrence of adverse incidents resulting from providing high doses of alcohol to overweight participants.

The bartender informed participants assigned to the placebo condition that they were in the alcohol condition; however, placebo participants received only a very lose dose of vodka (a calculated amount that would lead to a peak BrAC of 0.01% or less 30–60 min after drinking; as in the alcohol condition, the Hamwi formula was applied when appropriate). To maximize believability of the placebo condition, the bartender soaked the rims of the glasses and the lime slices in vodka before the participants' arrival and poured a precalculated mixture of water and vodka into the participants' drinks from a vodka bottle when preparing participants' drinks in front of them.

In all conditions, the bartender explained that participants had 10 min to consume each drink; thus, participants had 30 min to consume all three drinks. Participants engaged in small talk with the bartender and the confederate while drinking. (Note that the confederate left approximately 15 min into each participant's drinking session, purportedly to complete another portion of the experiment.)

Postdrinking Phase

After the intoxication manipulation in the bar, participants provided multiple BrAC measurements and engaged in a series of unrelated tasks, as previously noted. Next, participants completed the MRCI and, finally, were fully debriefed about the study. Research assistants

compensated and released participants with a BrAC of less than 0.04% after debriefing. Participants whose BrAC was not yet lower than 0.04% stayed in the lab until they reached that level and the research assistant felt they were in an appropriate state to be released, at which point they were compensated and released.

Results

Preliminary Data Analyses

Intoxication Manipulation Checks

At the start of the study (baseline), all participants were sober (BrAC = 0.00%). The average BrAC level immediately before MRCI administration in the alcohol condition was 0.07% (*SD* = 0.02; range = 0.03%–0.13%). All participants in the placebo and control conditions demonstrated a BrAC of 0.00% immediately before the MRCI administration. As a manipulation check that participants in the placebo condition believed that they had consumed alcohol, we asked all participants whether there was alcohol in their drinks. All participants in the alcohol condition (with the exception of one participant for whom the response to this item is missing), 68.2% of participants in the placebo condition, and 7.3% participants in the control condition indicated that there was alcohol in their drinks. Participants who indicated that they had consumed alcohol also estimated their peak intoxication level (1 = *extremely low* to 10 = *extremely high*): alcohol condition (n = 50), M = 6.30, SD = 1.44; placebo condition (n = 30), M = 4.15, SD = 1.74; and control condition (n = 3), M = 6.00, SD = 1.73.

Although placebo participants generally seemed to believe they were intoxicated, they did not believe that they were intoxicated to the same extent as did participants in the alcohol condition. This finding is not unique, given that past research has also shown that placebo participants often are less convinced of being intoxicated than participants in alcohol conditions

(e.g., Harvey & Beaman, 2021; Schreiber Compo et al., 2017; see also Schlauch et al., 2010, for a meta-analytic review of this topic). Yet even though not all of our placebo participants believed that they had consumed alcohol, independent-samples *t* tests revealed no significant differences between believing and nonbelieving placebo participants for any of the MRCI outcomes (see Table S3 in the supplemental material).

Verbal Comprehension Index Scores

Across all intoxication conditions, the average VCI score was 94.04 (*SD* = 11.08), with a range from 59 to 125. The lowest VCI score of 59 was the only outlier, at slightly more than three standard deviations below the mean. This participant had reported English as a second language. We included this participant's data in all analyses and review this decision in the Discussion section.

Given that we planned to use VCI as a covariate in our main analyses, we conducted a one-way analysis of variance (ANOVA) to ensure that VCI was independent from our intoxication manipulation. Results indicated no statistically significant differences, and very small effect-size differences, in VCI scores across conditions, $F(2, 133) = .02$, $p = .979$, $\eta_p^2 < .01$, which supports our use of VCI as a covariate: alcohol condition, $M = 94.29$, $SD = 9.88$; placebo condition, $M = 93.84$, $SD = 12.34$; control condition, $M = 93.95$, $SD = 11.35$.

Main Analyses

We used ANCOVAs to determine the effect of alcohol intoxication condition on participants' scores on the MRCI instruments (CMR-II, CMR-R-II, FRI, and CMV-II), covarying VCI scores. Given that we conducted ANCOVAs, we report both the unadjusted means and the means adjusted for the effect of VCI (see Table 1 for unadjusted means and Figures 1–4 for adjusted means). Note that we did conduct exploratory linear regressions to

examine whether alcohol-condition participants' BrAC predicted MRCI outcomes, while controlling for VCI. These analyses produced no significant findings (see Table S4 in the supplemental material).

Comprehension of Miranda Rights-II

Overall, participants produced unadjusted mean total scores of 8.83 (*SD* = 1.35) out of 10 on the MRCI's CMR-II instrument. As predicted, ANCOVA results revealed significant differences across intoxication conditions, when covarying VCI, $F(2, 132) = 11.08$, $p < .001$, $\eta_p^2 = .14$, 90% CI [.06, .23] (see Figure 1). Bonferroni-adjusted pairwise comparisons (critical $p = .017$ to control the Type 1 error rate) revealed that participants in the alcohol condition scored lower than did participants in the placebo and control conditions; CMR-II total scores did not differ significantly between the latter two conditions (see Table 2 for pairwise comparisons).

We also conducted an exploratory series of five ANCOVAs (critical $p = .010$) to determine whether participants' scores for each of the five rights varied as a function of intoxication condition, when covarying VCI. Results revealed that participants' understanding that they could stop questioning at any time varied depending on their intoxication status, $F(2, 132) = 4.85$, $p = .009$, $\eta_p^2 = 0.07$, 90% CI [.01, .14]. Specifically, Bonferroni-adjusted pairwise comparisons (critical $p = .017$) showed that participants in the alcohol condition demonstrated lower scores than those in the control condition but not those in the placebo group; scores did not differ between the placebo and control groups (see Table 2 for pairwise comparisons). There were no significant differences across intoxication conditions for the remaining four rights (although mean scores in the alcohol condition were consistently lower than those in the sober condition; see Table 2).

Comprehension of Miranda Rights-Recognition-II

Participants produced unadjusted mean total scores of 13.35 (*SD* = 1.32) out of 15 on the CMR-R-II instrument. Covarying VCI, CMR-R-II scores did not differ significantly across intoxication conditions, $F(2, 132) < .01$, $p > .999$, $\eta_p^2 < .01$. See Figure 2 for adjusted means and standard errors. Exploratory Bonferroni-corrected ANCOVAs (critical $p = .010$) assessing differences across intoxication conditions for each of the five CMR-R-II subscales, covarying VCI, did not result in any significant findings. (See Table S5 in the supplemental material for adjusted means and standard errors, as well as significance tests.)

Function of Rights in Interrogation

Overall, participants produced unadjusted mean total scores of 25.04 (*SD* = 2.79) out of 30 on the FRI instrument; mean scores for subscales (each scored out of 10) were as follows: Nature of Interrogation = 8.18 (*SD* = 1.84), Right to Counsel = 9.40 (*SD* = .95), Right to Silence = 7.47 (*SD* = 1.66). FRI total scores did not differ significantly across intoxication conditions when covarying VCI, $F(2, 132) = .30$, $p = .740$, $\eta_p^2 = .01$, 90% CI [0, .03] (see Figure 3 for adjusted means and standard errors). Furthermore, a series of three Bonferroni-corrected (critical $p = .017$) ANCOVAs, covarying VCI, indicated no significant effect of intoxication condition on performance on any of the three FRI subscales (see Table 3 for statistical results).

Comprehension of Miranda Vocabulary

Our analysis of CMV-II was based on a sample 135 participants (the MRCI administrator failed to complete the CMV instrument with one participant in the control condition). Participants produced unadjusted mean total scores of 27.90 (*SD* = 2.72) out of 32 on the CMV-II instrument. In line our with hypotheses, CMV-II scores significantly differed across intoxication conditions when covarying VCI scores, $F(2, 131) = 3.41$, $p = .036$, $\eta_p^2 = .05$, 90% CI [.002, .11]; of note, this analysis failed to assume homogeneity of regression slopes, because

linear regressions examining the predictive value of VCI scores on CMV-II scores for each of the three intoxication conditions revealed that VCI was predictive of CMV-II only for the alcohol ($b = 0.57$, $p < .001$) and placebo ($b = 0.52$, $p < .001$) groups, but not the control group ($b = 0.05$, $p = .757$). Bonferroni-adjusted pairwise comparisons (critical $p = .017$) revealed that participants in the alcohol condition scored lower on the CMV-II than participants in the control condition, $t(90) = 2.45$, $p = .016$, $d = -0.51$, 95% CI [−0.93, −0.10], but not lower than those in the placebo condition, $t(93) = 1.87$, $p = .065$, $d = -0.38$, 95% CI [−0.79, 0.02]. CMV-II total scores did not significantly differ between participants in the placebo and control conditions, $t(83) = 0.61$, $p = .543$, $d = -0.13$, 95% CI [−0.56, 0.29] (see Figure 4).

Discussion

The present study sought to determine whether alcohol intoxication negatively impacts individuals' ability to comprehend their *Miranda* rights. In line with AMT (Steele & Joseph, 1990), we predicted that intoxicated individuals would demonstrate *Miranda* comprehension impairment compared to their sober counterparts due to the negative impact alcohol intoxication has on working memory mechanisms and attention allocation. Using an experimental design, a lab-based approach for alcohol administration, and the MRCI to evaluate *Miranda* comprehension, we found partial support for our hypothesis.

Specifically, participants in the alcohol condition demonstrated poorer basic understanding of their *Miranda* warnings than did participants in both the placebo and control conditions, as measured by the CMR-II, which required participants to verbalize the meaning of the five central *Miranda* rights. Understanding of the continuation of rights (right to stop questioning at any time) seemed to be particularly impacted by alcohol, because intoxicated participants demonstrated significantly lower scores on this item compared to sober participants.

Intoxicated participants also demonstrated poorer comprehension of *Miranda*-specific vocabulary when compared with sober participants, but not placebo participants. These findings suggest that alcohol intoxication may be detrimental to individuals' most basic understanding of the underlying meaning of their rights, as well as of the vocabulary associated with those rights. In line with AMT, this negative impact of alcohol may be due to intoxicated individuals being unable to allocate cognitive resources toward appropriately comprehending their rights.

Yet our intoxicated participants fared no worse than their placebo and sober counterparts in terms of their scores on the *Miranda* recognition instrument (CMR-R-II). One potential explanation for this inconsistent finding may be that unlike with the CMR-II and the CMV instruments, performance on the CMR-R-II does not rely on participants' verbal expressive capabilities, because participants simply make a series of "same or different" judgments. Although the CMR-II may appear to be more robust than the CMR-R-II in terms of providing an opportunity to assess *Miranda* understanding in more detail, the MRCI manual (Goldstein et al., 2014) specifies that that these two measures must be used in combination to assess understanding, because they tap into different capacities. Specifically, the CMR-II may be challenging for individuals with verbal expression limitations (e.g., for developmental reasons or due to cognitive impairment). CMR-II scores may therefore underrepresent an individual's understanding relative to the CMR-R-II, which uses rights recognition to assess understanding and requires no verbal expression.

Considering this, our CMR-R-II findings lead us to contemplate the possibility that alcohol intoxication did not impact *Miranda* comprehension in the present sample, but rather was detrimental to participants' ability to verbalize meaning. Offering some support for this postulation are the relatively low VCI scores ($M = 94.04$) demonstrated by our sample of

undergraduate students (as a comparison, university students in a recent study demonstrated an average VCI score of 120.14; Weber et al, 2020). More than two-thirds of our sample indicated being bilingual, with many listing English second to another language. This frequency of bilingualism—with English as a second language—may explain the lower-than-expected VCI scores in the present sample, suggesting that the VCI score in this study may be more indicative of linguistic ability than intellectual ability. Thus, participants in this sample may have understood their rights more than their scores reflected, but they may have experienced a particularly heightened cognitive load when attempting to verbalize meanings as they processed rights in a second language. In line with AMT, alcohol intoxication could have further decreased allocation of cognitive resources to verbalizing meaning, leading to the detrimental impacts of alcohol intoxication demonstrated by results on the CMR-II and CMV-II.

However, when we consider our results on the *Miranda* appreciation instrument (FRI), our theory that verbalization deficits could explain our findings becomes less compelling. Our FRI results demonstrated that participants, regardless of intoxication status, were similarly able to grasp and verbalize the consequences of waiving and asserting rights. Given that the FRI requires verbal expressive abilities (as do the CMR-II and CMV instruments), we would have expected to see differential effects across intoxication groups for FRI scores. However, we did not find differences in FRI scores across intoxication groups. This therefore suggests that our significant CMR-II and CMV results are not completely attributable to the effect of alcohol on verbal expression. We suspect that the effects of intoxication may be due to some combination of a reduced ability to verbalize meaning and a negative impact on the most basic level of understanding of *Miranda* rights. Even though our findings are not purely attributable to verbal expressive abilities, it is still important to note that verbal expressive abilities are required for

explicit assertion of rights and during police questioning. Thus, if verbal expression related to *Miranda* is at all compromised, it could result in deficits in an intoxicated suspect's ability to function adequately during police questioning.

It is also crucial to note a separate aspect of our findings: Ceiling effects emerged across all MRCI instruments, as is expected with educated adult populations (e.g., Scherr & Madon, 2012). Relative to the lower mean scores that juvenile samples demonstrate on the MRCI (e.g., Haney-Caron et al., 2018; Zelle et al., 2015), participants in our sample appeared to have an overall better understanding of their rights, even when intoxicated. Yet it is still important to note that the intoxicated participants in our study did not perform on par with sober individuals in terms of understanding their rights, suggesting that intoxication may increase individuals' vulnerability to misunderstanding their rights—a vulnerability that may be further exacerbated by other dispositional risk factors. For example, juveniles, who already have a relatively poor understanding of *Miranda*, have reported undergoing interrogation while intoxicated (Malloy et al., 2014; Viljoen et al., 2005). This suggests that juveniles may constitute a doubly vulnerable group, but, unfortunately, one that cannot be ethically (or legally) studied, at least in the United States.

Limitations

As discussed, VCI scores in our sample were low considering participants were college students. We chose to include participants with low VCI scores in our analyses, recognizing that participants may have achieved higher VCI scores had the WASI-II been administered in their primary language. We based this decision on participants' apparent and reported English fluency and on their enrollment in an English-speaking institution. Police officers would likely read these participants their *Miranda* rights in English if they were ever questioned, and, therefore, their

English verbal capabilities would be relevant. Prior research suggests, however, that individuals whose native language is not English demonstrate impaired understanding of *Miranda* rights compared to English native speakers (e.g., Pavlenko et al., 2019). Thus, our findings underscore the notion that individuals who are not native English speakers may be at a further disadvantage when intoxicated and read their rights in English—a possibility that future research should examine empirically.

Additionally, the present study is low in external validity, given that participants were college students and their BrAC levels were generally low (M = 0.07%). It is, however, important to note, first, that the legal blood alcohol content for driving in 113 out of 178 countries globally is set at 0.07 or lower, indicating that our sample would be considered "intoxicated" in many countries (World Health Organization, 2018), and, second, that even lower lab-induced BrAC levels demonstrate an impact on cognitive functioning (e.g., Fillmore, 2007). Future research should thus examine the effects of intoxication on *Miranda* comprehension in other populations (e.g., community members) and at BrAC levels more demonstrative of real-world settings. Law enforcement officers typically encounter suspects demonstrating higher BrACs (.011%–0.13%; Evans et al., 2009), and in line with research suggesting increased cognitive impairment in witnesses' memory for events at higher BrAC levels (e.g., Altman et al., 2019), individuals' comprehension of their rights may further deteriorate with greater intoxication. Thus, we encourage researchers to test *Miranda* comprehension in the field with highly intoxicated individuals (see Altman et al., 2019, and Van Oorsouw et al., 2015, for examples of field studies with highly intoxicated participants). We expect that complementing the present findings with field research will offer researchers, practitioners, and policy makers a more comprehensive understanding of alcohol intoxication's impact on *Miranda* comprehension.

We also recognize that the present study lacked ecological validity in terms of examining *Miranda* comprehension in a high-stress, high-stakes setting. In investigative settings, being read one's rights by law enforcement would suggest that one is being arrested—arguably a stressful situation in which decisions about rights have major consequences. In line with AMT, such stress may be of further detriment to *Miranda* comprehension, thereby enhancing the negative impact of alcohol intoxication on comprehension through potential decreases in attention-allocation capabilities—an issue that participants in the present study may not have encountered, given that they were not concerned with being in legal trouble. Thus, we pose to future researchers the challenge of developing experimental procedures to address this topic. Also, concerning our method of measuring *Miranda* comprehension, we note the limitation of our MRCI test administrators not being blind to participants' intoxication status, which may have increased the potential for administrator bias. We believe, however, that we addressed this logistical constraint to the best of our ability by keeping test administrators blind to the study's hypotheses and by using the third author's scoring of participants' MRCI responses.

Suggestions for Practice and Future Directions

Our study's results regarding alcohol's effect on *Miranda* comprehension do not fully support the courts' assumption that intoxicated individuals are able to "knowingly, intelligently, and voluntarily" waive their rights. Despite the fact that participants in the present study demonstrated a general understanding and appreciation of their rights, alcohol intoxication did lead to lower scores on two of the four *Miranda* comprehension instruments, as compared to sober (CMV-II) or sober and placebo (CMR-II) individuals' scores. Further research is needed to understand the underlying mechanisms driving this effect, but until then, we rely on cognitive

theory (i.e., AMT) to guide our recommendation that law enforcement allow suspects to "sober up" before reading them their rights.

By waiting for intoxicated suspects to become sober before reading them their rights and allowing them to engage in implicit or explicit rights waivers, law enforcement may not only be protecting individuals' constitutional rights but also protecting the integrity and admissibility of information elicited during subsequent questioning. Alcohol may negatively impact a suspect's perceptions of future consequences (as predicted by AMT) and, therefore, may lead individuals to waive their rights more readily. This is concerning, given that waiving one's rights while intoxicated can lead to being interrogated while intoxicated, which in turn may exacerbate one's likelihood of confessing (e.g., Sigurdsson & Gudjonsson, 1994)—another important topic for future investigation. Indeed, our findings indicated that alcohol negatively impacts individuals' understanding that they can stop questioning at any time, thus suggesting that intoxicated individuals may not invoke their rights once questioning begins. Furthermore, intoxicated *Miranda* waivers (and intoxicated confessions) are not viewed favorably by potential jurors (e.g., Mindthoff et al., 2020)—a finding that law enforcement should consider in order to protect the perceived reliability and validity of evidence at the trial level.

Ultimately, much more research is needed to fully understand the intricacies of alcohol's effects on *Miranda*. For instance, studies should examine the implications intoxication has for waiver decisions. Although some empirical work on *Miranda* waivers has been conducted (e.g., Kassin & Norwick, 2004; Scherr & Franks, 2015; Scherr & Madon, 2012, 2013), more work is needed on the impact of the various risk factors (alcohol intoxication included) on waivers. We believe that our present findings can complement such future waiver research, offering a

foundation that can be valuable for interpreting the meaning of findings when exploring the underlying reasons for waiver decisions.

To conclude, developing a comprehensive understanding of the full extent to which alcohol intoxication impacts *Miranda* comprehension and waivers is critical. Not only can such work advance cognitive theory as it applies in legal contexts, but it can also inform assumptions made by the courts that are currently not completely supported by empirical evidence. By further developing this field of research, we can offer empirical evidence for law enforcement, legal actors, and the courts to make informed decisions in cases such as Travis Jewell's.

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Table 1

Raw Means and Standard Deviations (by Intoxication Condition) for MRCI Subscales and Items

MRCI Subscales and Items	*M* (*SD*)			
	Alcohol	Placebo	Sober	Total
CMR-II subscales				
1. Right to silence	1.65 (0.72)	1.89 (0.32)	1.85 (0.48)	1.79 (0.55)
2. Statement used in court	1.63 (0.63)	1.77 (0.52)	1.83 (0.50)	1.74 (0.56)
3. Right to attorney	1.49 (0.58)	1.73 (0.50)	1.78 (0.42)	1.65 (0.52)
4. Right to appointed attorney	1.84 (0.42)	1.84 (0.43)	1.95 (0.22)	1.88 (0.37)
5. Continuation of rights	1.61 (0.72)	1.82 (0.50)	1.95 (0.31)	1.78 (0.57)
Total score (0–10)	8.22 (1.53)	9.05 (1.18)	9.37 (0.97)	8.83 (1.35)
CMR-R-II subscales				
1. Right to silence	2.67 (0.65)	2.82 (0.45)	2.71 (0.56)	2.73 (0.56)
2. Statement used in court	2.80 (0.53)	2.75 (0.44)	2.80 (0.40)	2.79 (0.46)
3. Right to attorney	2.65 (0.59)	2.59 (0.58)	2.56 (0.50)	2.60 (0.56)
4. Right to appointed attorney	2.31 (0.65)	2.27 (0.59)	2.32 (0.65)	2.30 (0.62)
5. Continuation of rights	2.92 (0.27)	2.91 (0.29)	2.95 (0.22)	2.93 (0.26)
Total score (0–15)	13.35 (1.48)	13.34 (1.18)	13.34 (1.30)	13.35 (1.32)
FRI subscales				
1. Nature of interrogation	8.12 (1.69)	8.02 (2.06)	8.41 (1.77)	8.18 (1.84)
2. Right to counsel	9.27 (1.06)	9.36 (1.04)	9.59 (0.67)	9.40 (0.95)
3. Right to silence	7.65 (1.69)	7.43 (1.81)	7.29 (1.47)	7.47 (1.66)
Total score (0–30)	25.04 (2.97)	24.82 (2.95)	25.29 (2.40)	25.04 (2.79)
CMV-II items				
1. Consult	1.51 (0.64)	1.57 (0.62)	1.63 (0.49)	1.56 (0.59)
2. Attorney	1.53 (0.58)	1.68 (0.47)	1.70 (0.52)	1.63 (0.53)
3. Questioning	1.92 (0.39)	1.93 (0.33)	2.00 (0.00)	1.95 (0.31)
4. Used against	1.57 (0.73)	1.73 (0.62)	1.63 (0.74)	1.64 (0.70)
5. Right	1.55 (0.64)	1.68 (0.56)	1.60 (0.59)	1.61 (0.60)
6. Lawyer	1.57 (0.54)	1.50 (0.51)	1.50 (0.55)	1.53 (0.53)
7. Statement	1.45 (0.67)	1.41 (0.58)	1.45 (0.64)	1.44 (0.63)
8. Entitled	1.63 (0.75)	1.89 (0.39)	1.93 (0.35)	1.80 (0.56)
9. Afford	1.96 (0.28)	1.95 (0.30)	2.00 (0.00)	1.97 (0.24)
10. Advice	1.59 (0.61)	1.64 (0.49)	1.65 (0.48)	1.62 (0.53)
11. Interrogation	1.92 (0.34)	2.00 (0.00)	2.00 (0.00)	1.97 (0.21)
12. Remain	1.94 (0.31)	1.98 (0.15)	1.95 (0.32)	1.96 (0.27)
13. Appoint	1.75 (0.59)	1.86 (0.46)	1.85 (0.48)	1.81 (0.52)
14. Present	1.84 (0.50)	1.80 (0.51)	1.85 (0.48)	1.83 (0.50)
15. Confession	1.71 (0.50)	1.86 (0.41)	1.90 (0.30)	1.81 (0.43)
16. Represent	1.80 (0.57)	1.66 (0.71)	1.88 (0.40)	1.78 (0.58)
Total score (0–32)	27.24 (3.25)	28.14 (2.35)	28.50 (2.18)	27.90 (2.72)

Table 2

ANCOVA Results and Pairwise Comparisons for CMR-II Scores (Covarying VCI)

Outcome	$M_{adjusted}$ ($SE_{adjusted}$)			Comparison	Statistical results
	Alcohol (n = 51)	Placebo (n = 44)	Sober (n = 41)		
CMR-II (total score)***	8.21 (0.17)	9.05 (0.19)	9.37 (0.19)		$F(2, 132) = 11.08$, $p < .001$, $\eta_p^2 = .14$, 90% CI [.06, .23]
				Alcohol vs. Sober[b]	$t(90) = 4.47$, $p < .001$, $d = -0.94$, 95% CI [−1.37, −0.51]
				Alcohol vs. Placebo[b]	$t(93) = 3.31$, $p = .001$, $d = -0.68$, 95% CI [−1.10, −0.27]
				Placebo vs. Sober	$t(83) = 1.18$, $p = .240$, $d = -0.26$, 95% CI [−0.68, 0.17]
Right to silence	1.65 (.08)	1.89 (.08)	1.85 (.09)		$F(2, 132) = 2.77$, $p = .066$, $\eta_p^2 = .04$, 90% CI [.00, .10]
Statement used in court	1.63 (.08)	1.77 (.08)	1.83 (.09)		$F(2, 132) = 1.67$, $p = .192$, $\eta_p^2 = .03$, 90% CI [.00, .07]
Right to attorney	1.49 (.07)	1.73 (.08)	1.78 (.08)		$F(2, 132) = 4.42$, $p = .014$, $\eta_p^2 = .06$, 90% CI [.01, .13]
Right to appointed attorney	1.84 (.05)	1.84 (.06)	1.95 (.06)		$F(2, 132) = 1.25$, $p = .291$, $\eta_p^2 = .02$, 90% CI [.00, .06]
Continuation of rights[a]	1.61 (.08)	1.82 (.08)	1.95 (.09)		$F(2, 132) = 4.85$, $p = .009$, $\eta_p^2 = .07$, 90% CI [.01, .14]
				Alcohol vs. Sober[b]	$t(90) = 3.04$, $p = .003$, $d = -0.64$, 95% CI [−1.06, −0.22]
				Alcohol vs. Placebo	$t(93) = 1.92$, $p = .058$, $d = -0.40$, 95% CI [−0.80, 0.01]
				Placebo vs. Sober	$t(83) = 1.12$, $p = .267$, $d = -0.24$, 95% CI [−0.67, 0.18]

Note. ANCOVA = analysis of covariance; CMR-II = Comprehension of Miranda Rights-II; VCI = Verbal Comprehension Index; CI = confidence interval.

[a]Significant at critical $p = .010$. [b]Significant at critical $p = .017$.
***$p < .001$.

Table 3

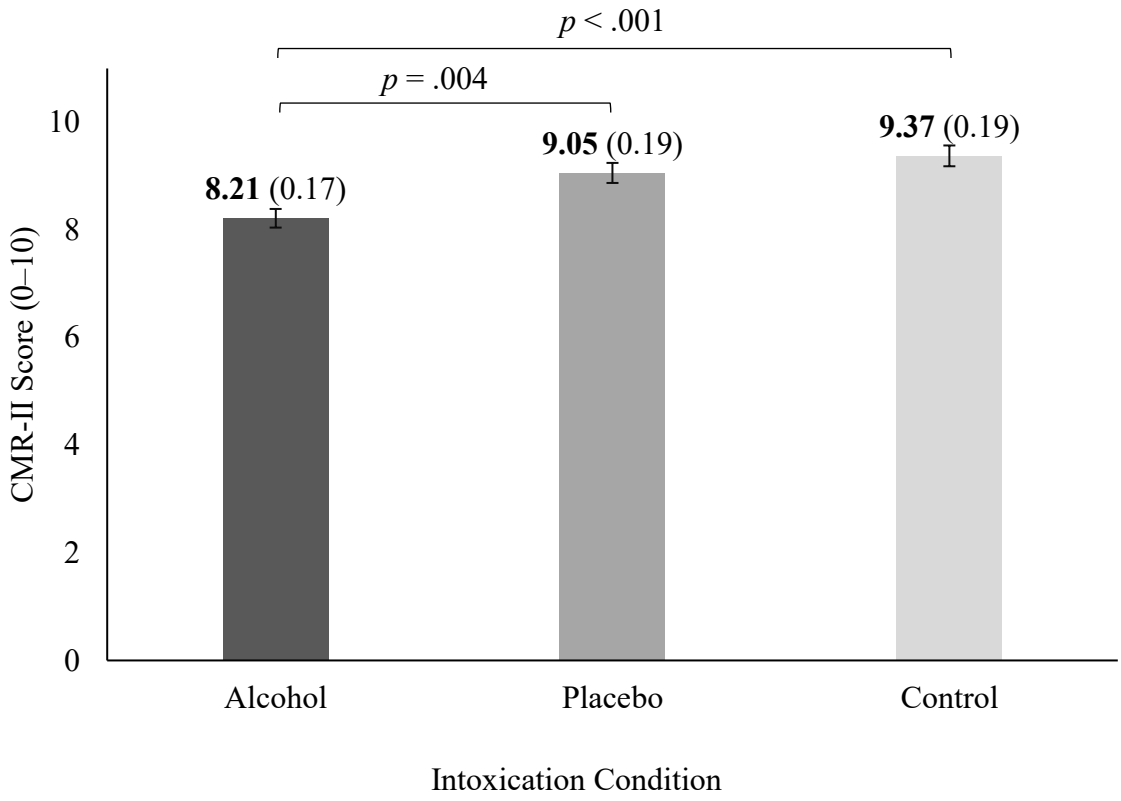
ANCOVA Results for FRI Scores (Covarying VCI)

Outcome	$M_{adjusted}$ ($SE_{adjusted}$)			Statistical results
	Alcohol (n = 51)	Placebo (n = 44)	Sober (n = 41)	
FRI (total score)	25.03 (0.39)	24.82 (0.42)	25.30 (0.44)	$F(2, 132) = 0.30$, $p = .740$, $\eta_p^2 = .01$, 90% CI [.00, .03]
Nature of Interrogation	8.11 (0.26)	8.03 (0.28)	8.42 (0.29)	$F(2, 132) = 0.52$, $p = .595$, $\eta_p^2 = .01$, 90% CI [.00, .04]
Right to Counsel	9.28 (0.13)	9.36 (0.14)	9.59 (0.15)	$F(2, 132) = 1.23$, $p = .297$, $\eta_p^2 = .02$, 90% CI [.00, .06]
Right to Silence	7.64 (0.23)	7.43 (0.25)	7.30 (0.26)	$F(2, 132) = 0.49$, $p = .614$, $\eta_p^2 = .01$, 90% CI [.00, .04]

Note. For Nature of Interrogation, Right to Counsel, and Right to Silence, ANCOVAs were Bonferroni-corrected (critical $p = .017$). ANCOVA = analysis of covariance; FRI = Function of Rights in Interrogation; VCI = Verbal Comprehension Index; CI = confidence interval.

Figure 1

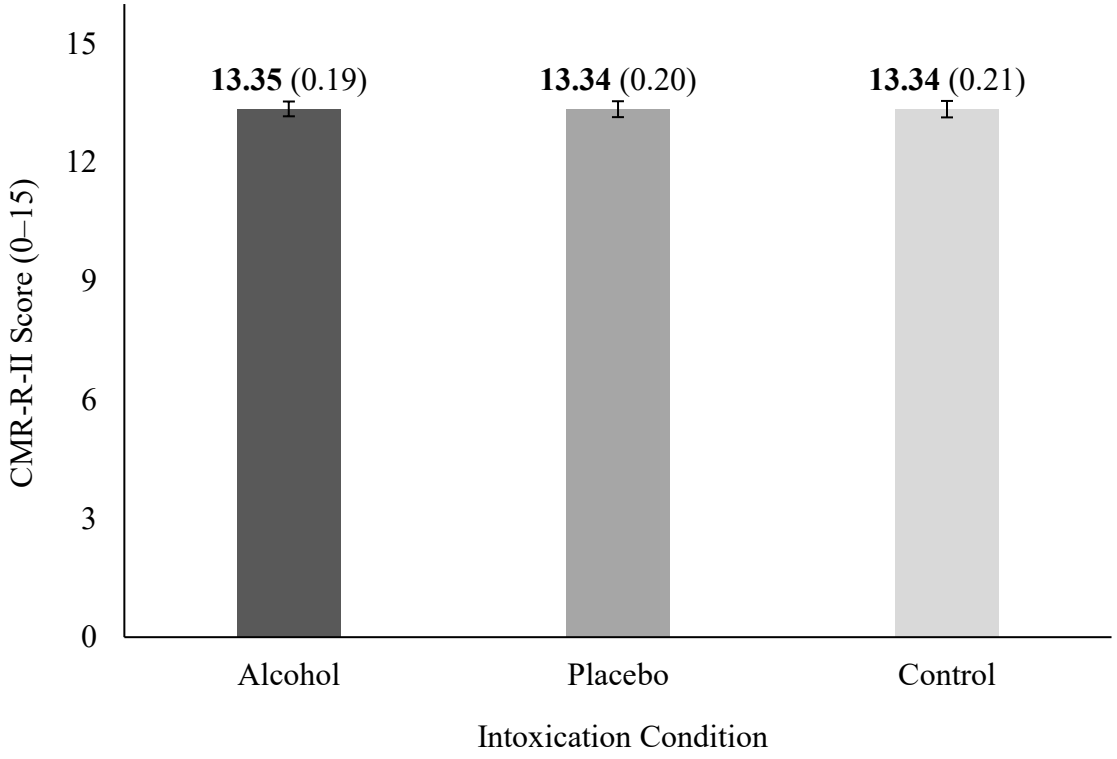
Adjusted Means and Standard Errors for CMR-II Scores by Intoxication Condition



Note. Means have been adjusted for the effect of Verbal Comprehension Index scores. Error bars represent standard errors, which are also presented in parentheses. CMR-II = Comprehension of Miranda Rights-II.

Figure 2

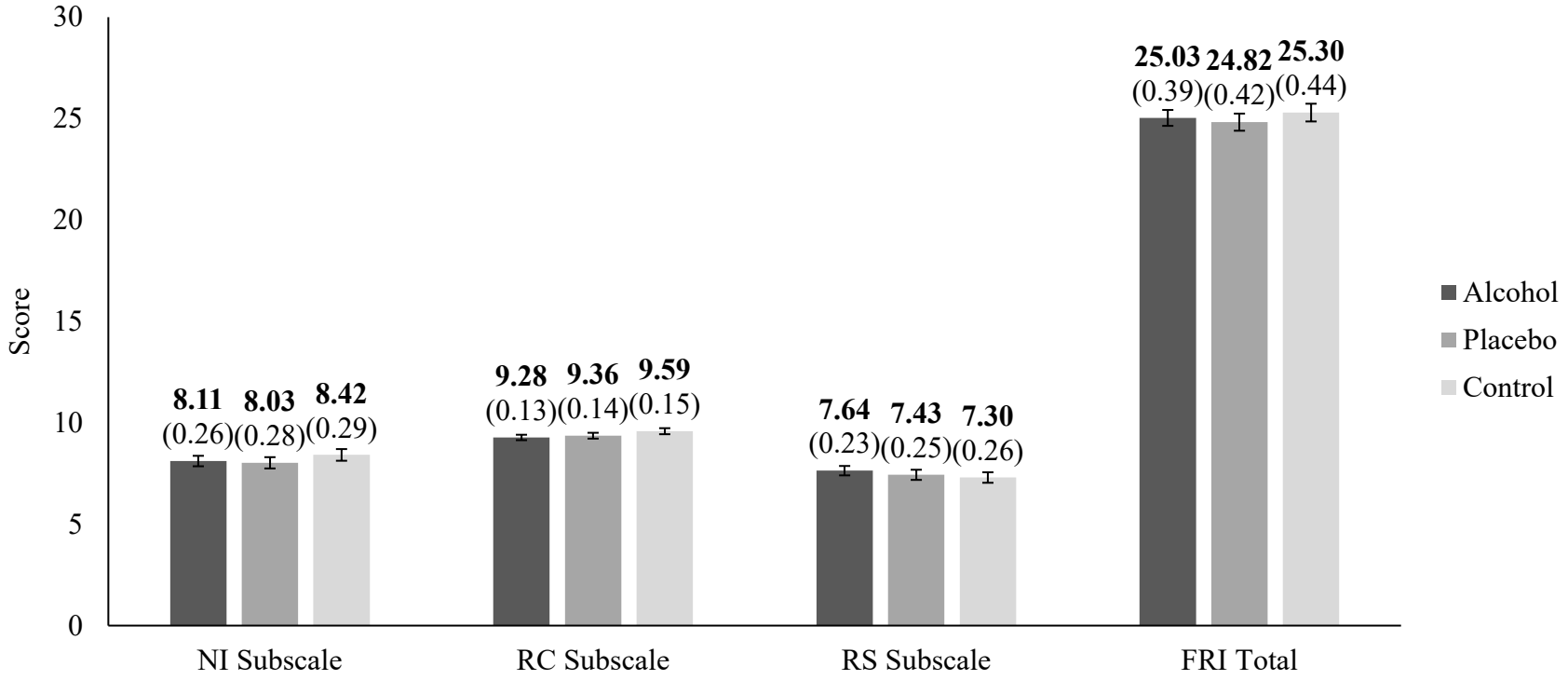
Adjusted Means and Standard Errors for CMR-R-II Scores by Intoxication Condition



Note. Means have been adjusted for the effect of Verbal Comprehension Index scores. Error bars represent standard errors, which are also presented in parentheses. CMR-R-II = Comprehension of Miranda Rights-Recognition-II.

Figure 3

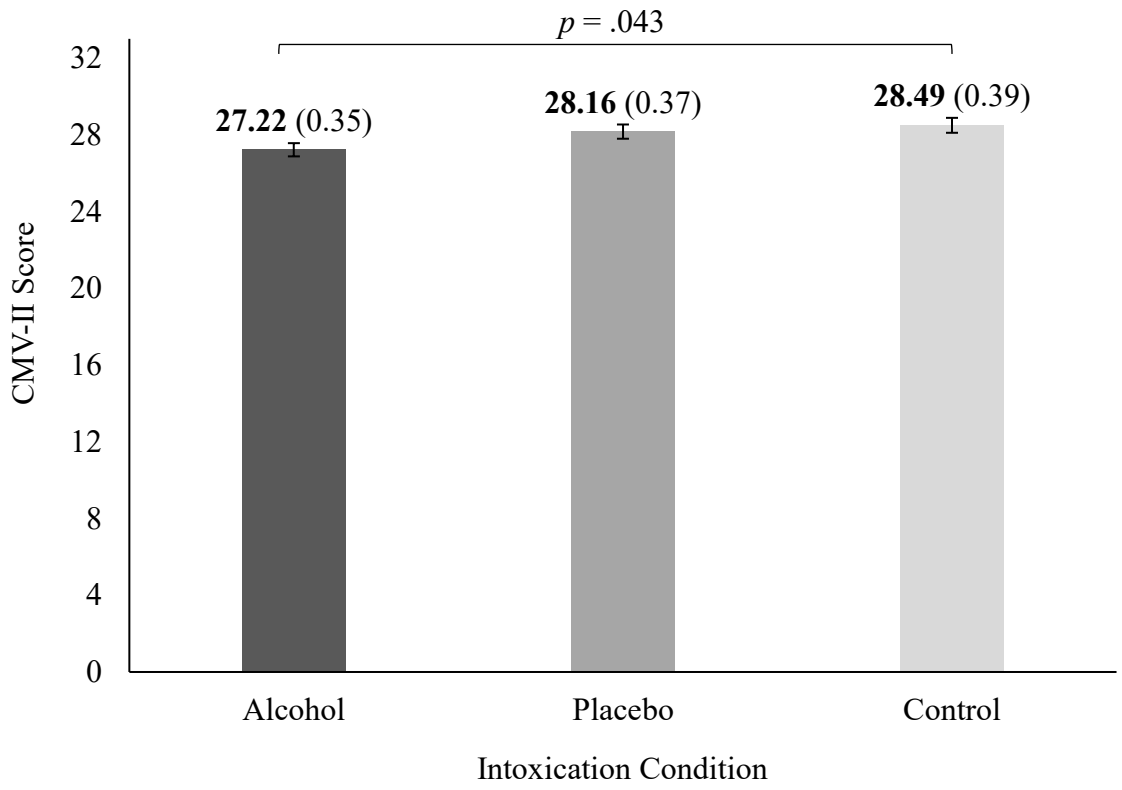
Adjusted Means and Standard Errors for Nature of Interrogation, Right to Counsel, and Right to Silence Subscales and Function of Rights in Interrogation Total Scores by Intoxication Condition



Note. Means have been adjusted for the effect of Verbal Comprehension Index scores. Error bars represent standard errors, which are also presented in parentheses. Scores for the Nature of Interrogation (NI), Right to Counsel (RC), and Right to Silence (RS) subscales ranged from 0–10. Scores for the Function of Rights in Interrogation (FRI) ranged from 0–30 (representing the additive total of the three subscales).

Figure 4

Adjusted Means and Standard Errors for CMV-II Scores by Intoxication Condition



Note. Means have been adjusted for the effect of Verbal Comprehension Index scores. Error bars represent standard errors, which are also presented in parentheses. CMV-II = Comprehension of Miranda Vocabulary-II.