

Differential Validity in Risk Screening of Impaired Driving Offenders

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Abstract

Differential predictive validity of the Mortimer-Filkins Questionnaire was examined with respect to ethnicity in a sample of 4,633 convicted drink driving offenders in Mississippi. Linear-logistic regression analysis indicated the instrument is a stronger predictor of drink driving recidivism among Caucasians than African-Americans. Practical implications of a finding of differential validity for risk screening are discussed, and the need to evaluate other instruments with respect to differential validity is addressed.

Introduction

Screening and assessment of alcohol problems among persons convicted of driving under the influence (DUI) is a standard practice in many jurisdictions, and selecting an appropriate assessment procedure or instrument is an important decision which must be made by many DUI service providers. Wells-Parker and Popkin (1) noted that assessment is usually performed to: (a) identify offenders who are at higher risk of repeating a DUI offense (and who therefore may merit more intensive treatment), and/or (b) to match offenders to appropriate treatment. Numerous studies have examined the criterion-related validity of alternative alcohol assessment/screening instruments, but the psychometric properties of DUI assessment instruments across distinct subgroups remains largely unexplored. If the validity of instruments varies across subgroups, their use in treatment assignment and sentencing is potentially problematic.

Boehm (2, p. 147) defined differential validity as occurring when "...at least one of the validity

coefficients is significantly different from zero and the two coefficients are significantly different from each other." In this report, we test the differential validity of a widely used assessment instrument, the Mortimer-Filkins Questionnaire (MFQ), as a predictor of drink-driving recidivism across populations of Caucasian and African-American DUI offenders.

Method

The Mortimer-Filkins (MF) test was specifically designed to identify problem drinkers among individuals convicted of DUI. It was developed at the Highway Safety Research Institute at the University of Michigan for the National Highway Traffic Safety Administration (3) and consists of a questionnaire (MFQ) and an interview schedule (MFI). The MFQ and the MFI are used together to calculate a total Mortimer-Filkins score (MFT). Prior analyses have found the MF to be a statistically significant predictor of DUI recidivism (4, 5), and it appears to compare favorably with other tests such as the Severity of Alcohol Dependence Questionnaire, the Holmes Alcohol Scale, and the MacAndrew Alcoholism Scale in its ability to identify problem drinkers (6).

The primary analyses reported in this study were based on data collected from convicted DUI offenders with valid Mississippi driver's licenses who attended the Mississippi Alcohol Safety Education Program (MASEP) in 1993. MASEP is a court mandated intervention program for first-offender DUIs. Offenders who enroll in MASEP complete a machine scored registration/intake form which includes the MFQ and a 10-item social desirability scale based on Crowne and Marlowe (7). It also collects data on sociodemographic characteristics and breath alcohol concentration (BAC) at time of arrest. Information on BAC was transferred from the court-order form to the intake form by MASEP instructors. Valid MFQ scores were obtained from 4,815 participants (i.e., 88.1% of all enrollees). Non-valid MFQ scores were primarily the result of low reading skills.

The participants ranged in age from 16 to 83 ($M = 33.8$, $SD = 11.3$), averaged 12.2 years of education ($SD = 2.4$), 84.4% were male, 71% were Caucasian, 28% were African-American, and one percent were other ethnic categories. These other ethnic categories were not included in the analyses because of small numbers. The participants' average MFQ score was 18.5 ($SD = 8.2$), and their average BAC was 166.98 mg/dl ($SD = 46.96$). BAC information was unavailable for substantial numbers of participants. To avoid selection bias that may be introduced by eliminating those with missing BACs, BAC was collapsed into four categories: (1) < 150 mg/dl, (2) 150 - 199 mg/dl, (3) ≥ 200 mg/dl, and (4) missing.

Mississippi Highway Patrol driving records were checked in 1997 to identify DUI recidivism events. At 12-, 24-, 36-, and 48-month tracking periods, DUI recidivism rates were 8.9%, 17.8%, 24.3%, and 27.6%, respectively. The primary analyses in this report were based on the 36-month tracking period. Prior DUI arrests were observed for 11.4% of the participants. After listwise deletion of missing data on all analyzed variables, 4,633 participants with complete intake data and driving records were available for analysis. To facilitate interpretation, all continuous variables were standardized prior to analysis.

The analysis was replicated using an independent sample of participants who attended MASEP in 1992. Identical measurement procedures were used for both samples. Following listwise deletion

of missing data, 4,587 participants were available for analysis in the 1992 sample. Recidivism rates for 12-, 24-, 36-, and 44-month tracking periods for the 1992 sample were 9.8%, 17.4%, 23.2%, and 24.8%, respectively. About 26.6% of the participants in the 1992 sample were African-American.

Results

The MFQ was a statistically significant predictor of DUI recidivism for both Caucasians and African-Americans (Table 1). Among Caucasians, a one standard deviation increase in MFQ scores increased the expected odds of DUI recidivism by a factor of 1.453 (Model 1). For African-Americans, the corresponding relationship between MFQ scores and recidivism was considerably weaker: i.e., a one standard deviation increase in MFQ scores increased the expected odds of recidivism by a factor of only 1.222 (Model 2). To determine if the predictive efficacy of the MFQ on DUI recidivism was significantly different for African-Americans than for Caucasians, a first-order race by MFQ interaction effect was constructed (Model 3). The logistic-regression coefficient estimating the first-order interaction effect was statistically significant ($b = -.173$, $p = .026$). This coefficient indicates the effect of the MFQ on the expected log-odds of DUI recidivism is .173 units weaker among African-Americans than Caucasians. The estimated odds for the first-order race by MFQ interaction effect indicates the relationship between MFQ and 36-month recidivism is only about .841 times as strong for African-Americans as for Caucasians.

The efficacy of the MFQ as a predictor of DUI recidivism in these two subpopulations was assessed by calculating the area under the receiver operating characteristic (ROC) curve. A ROC curve is the sensitivity (true positive rate) plotted against one minus the specificity (true negative rate) (8, 9, 10). The area under the ROC curve, sometimes symbolized as d' , ranges from .5, indicating the predictor (or set of predictors) offers no improvement over classification based on chance, to 1.0, indicating perfect discrimination. Rice and Harris (8) recommend using d' as a measure of predictive efficacy.

Among Caucasians, d' is .615 (Table 1). By comparison, the predictive efficacy of the MFQ among African-Americans was substantially weaker (.557). Given the complexity of predicting DUI recidivism, it is not surprising that knowledge of MFQ scores provides a relatively modest reduction in classification errors in any population. The relative magnitude of these d' 's, however, does indicate the MFQ is a more effective assessment instrument among Caucasians than among African-Americans.

To control for potential confounding effects, gender, age, educational attainment, BAC, and prior DUI arrests were entered as control variables (Table 1, Model 4). The first-order race by MFQ interaction was only slightly attenuated in magnitude ($b = -.164$, $p = .037$) and remained statistically significant. The main effect for MFQ indicates that for Caucasians a one standard deviation increase in MFQ scores increases the expected odds of recidivism by a factor of 1.344. The corresponding effect among African-Americans is 1.140 (i.e., $.848 * 1.344$). Thus, there is clear evidence of differential predictive validity even after controlling for potential confounding effects.

A summary of the effects observed in the replication analyses is shown in Table 2. Model 1 and

Model 2 give the effect on the odds of DUI recidivism for a one standard deviation increase in MFQ scores for Caucasians and African-Americans, respectively. Model 3 gives the effect on the odds of recidivism for the first-order race by MFQ interaction with no controls; and Model 4 gives the effect on the odds of recidivism for the first-order race by MFQ interaction controlling for potential confounding variables.

Table 1: Logistic Regression Models Estimating Differential Predictive Validity.

	MODEL 1		MODEL 2		MODEL 3		MODEL 4	
	b	Exp(b)	b	Exp(b)	b	Exp(b)	b	Exp(b)
MFQ	.373	1.453**	.201	1.222**	.373	1.453**	.296	1.344**
RACE								
Black					.222	1.248*	.205	1.227**
White (Ref.)								
RACE by MFQ					-.173	.841*	-.164	.848*
GENDER								
Female							-.452	.637**
Male (Ref.)								
AGE							-.110	.896**
EDUC							-.103	.903**
BAC ^a								
< 150							-.394	.674**
150 - 199							-.150	.861
≥200							.087	1.091
Missing (Ref.)								
SDS							-.033	.968
PRIORS							.628	1.873**
CONSTANT	-1.226		-1.004		-1.226		-1.104	
Area Under ROC	.615		.557		.602		.640	
Valid N	3,341		1,292		4,633		4,633	

a Contrasts were parameterized using indicator coding. Statistical significance of the four-category BAC variable was tested by using a Wald statistic with 3 df.

* p < .05

** p < .01

The effect on the odds of DUI recidivism among Caucasians (Model 1) was statistically significant for all tracking periods in both the 1992 and 1993 samples. Among African-Americans, the MFQ was not a significant predictor of 12-month recidivism in either year. Additionally, it was not a significant predictor of 24-month recidivism among African-Americans in the 1992 sample. Results for both years suggest the MFQ is a slightly stronger

predictor of long-term than short-term recidivism among African-Americans. Since race was scored 1 if African-American, 0 if Caucasian, the odds coefficients reported for model 3 indicate the MFQ is a weaker predictor of recidivism among African-Americans. All first-order race by MFQ interaction effects, with the exception of the 48-month tracking period without controls, were statistically significant. The first-order race by MFQ interaction effects were strongest for the 12-month tracking period. These results suggest considerable stability in differential predictive validity.

Table 2. Summary of the Effects on the Odds of DUI Recidivism for Replication Analyses.

	1993 Sample			
	Model 1 (Exp. b)	Model 2 (Exp. b)	Model 3 (Exp. b)	Model 4 (Exp. b)
12-Month	1.504**	1.099	.731**	.726**
24-Month	1.505**	1.188*	.815*	.795**
48-Month	1.427**	1.217**	.881	.859*

	1992 Sample			
	Model 1 (Exp. b)	Model 2 (Exp. b)	Model 3 (Exp. b)	Model 4 (Exp. b)
12-Month	1.456**	1.031	.708**	.712*
24-Month	1.423**	1.114	.796*	.804*
36-Month	1.451**	1.173*	.808*	.813*
48-Month	1.420**	1.179*	.830*	.837*

* p < .05

** p < .05

Model 1 = Caucasians only.

Model 2 = African-Americans only.

Model 3 = First-order race by MFQ interaction, no controls.

Model 4 = First-order race by MFQ interaction, with controls.

Discussion

The current findings clearly indicate that the psychometric properties of the MFQ differ for African-Americans and Caucasians in the population of Mississippi DUI offenders. Our analysis indicated the MFQ is a significantly less effective predictor of DUI recidivism for African-Americans than for Caucasians.

We are aware of only one study in which the predictive validity of alcohol screening/assessment instruments has been examined across distinct ethnic populations. Volk and associates (11) used the Alcohol Use Disorders and Associated Disabilities Interview Schedule as a criterion to test

the validity of the Alcohol Use Disorders Identification Test (AUDIT). The AUDIT was developed under the auspices of the World Health Organization as a brief screening instrument which could be used to identify persons at risk of developing alcohol related problems (11). A multi-national sample was used to develop the instrument, and special attention was given to cross-cultural generalizability (12). No evidence of differential validity across gender or ethnic populations was found (11). However, it is important to note that DUI recidivism is a distinctly different criterion from measures of alcohol dependency, and it cannot be assumed that results using these two distinctly different criteria are comparable.

Our findings suggest a clear need to more closely examine the psychometric properties of alcohol screening/assessment instruments across distinct populations. Assessment instruments with desirable psychometric properties in Caucasian populations may be less effective for use in ethnically diverse populations. Future research should more carefully evaluate the psychometric properties of screening/assessment instruments across the distinct populations in which they are used. It is important to note that it cannot be concluded from this analysis that the finding of differential validity for the MFQ means that it is inferior to other DUI risk screening instruments because the differential validity of other instruments with regard to DUI recidivism prediction has never been examined.

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