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Assessing Drinking and Driving Attitudes and Behavior: Factor Structure of the Drinking and Driving Scale

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Drinking and driving is a common problem in the United States, with approximately 11.3% of Americans reporting engaging in the behavior at least once in their lifetime. However, no paper self-report measure of attitudes toward and likelihood of engaging in drinking and driving appear to exist. The current study builds upon a telephone questionnaire from Snortum & Berger (1989). Results from an Exploratory Factor Analysis on Subsample 1 of the data suggest the presence of 4 factors that explain roughly 56% of total variance. Further, a Confirmatory Factor Analysis on Subsample 2 of the data confirms this factor structure.

Keywords: drink, drive, exploratory factor analysis, confirmatory factor analysis

Although the rate of alcohol-involved car accidents is steadily decreasing (Snortum & Berger, 1989), drinking and driving is still a common problem. Motor vehicle crashes are the leading cause of death for individuals between the ages of 15 and 24 (Arias et al., 2003). Clark & Midanik (1982) reported that 59% of underage youth reported riding with an alcohol- impaired driver. In addition, Chou et al. (2006) report that a full 11.3% of American adults (about 23.4 million people) reported drinking and driving at least once in their lifetime. Drinking and driving is a problem not only for the damage it causes, but also for the frequency with which it occurs.

Given that this is still a pervasive problem, attitudes toward drinking and driving are important as they may serve as important indicators of those that will drink and drive. One proposed reason for the decline in these behaviors is the implementation of more severe laws involving drinking and driving. While it is typically assumed that laws cause a reduction in behavior by instilling a fear of punishment, there is evidence supporting the idea that laws influence personal perception and social norms (Snortum, 1988). These new perceptions and norms result in changed behaviors. It is because of this that attitudes towards drinking and driving are an important aspect to investigating these behaviors. While drinking and driving has been acknowledged as a social problem by researchers in many countries (Gusfield, 1985; Sheehan, 1994), there is still a need to examine everyday opinions towards this behavior.

In a series of studies, researchers examined drinking and driving attitudes through phone surveys (Snortum & Berger, 1989; Berger & Marelich, 1997; Marelich, Berger, & McKenna, 2000). For these studies, researchers used random digit telephone survey methods to contact licensed drivers throughout California. Willing participants were then led through a series of questions about drinking and driving attitudes and behaviors. There were a total of 30 items used in these studies. However, the factor structure and reliability of these questions was not examined.

A common concern in psychological self-report research is the potential for participants to lie when asked about certain behaviors. In fact, this concern is so serious that some (i.e., Crowne & Marlowe, 1960) have developed measures to detect this pattern of responding. It seems likely that participants would behave in more socially appropriate ways when in the presence of a researcher, especially when compared to situations where participation is completely anonymous and from the safety of one's own home. While multiple studies discuss measures of drinking and driving, these studies (e.g., Baum, Sheehan, Ferguson, & Schonfeld, 1998; Greenfield & Rogers, 1999) tend to rely on

Table 1
Correlation Matrix for Exploratory Factor Analysis

Var	3	4	5	9	10	11	12	15	16	17	19	20	21
3	1.00												
4	.49	1.00											
5	.60	.55	1.00										
9	-.28	-.22	-.34	1.00									
10	-.25	-.18	-.16	.41	1.00								
11	-.28	-.23	-.27	.38	.52	1.00							
12	-.31	-.24	-.31	.38	.48	.66	1.00						
15	.21	.17	.30	-.30	-.18	-.20	-.24	1.00					
16	.01	.02	.08	-.06	-.04	-.06	-.04	.74	1.00				
17	.01	-.03	.11	-.01	.00	-.05	-.05	.54	.66	1.00			
19	.55	.65	.60	-.31	-.25	-.28	-.32	.26	.03	.08	1.00		
20	.58	.52	.71	-.38	-.24	-.31	-.36	.37	.08	.08	.74	1.00	
21	.55	.51	.70	-.36	-.20	-.29	-.34	.41	.16	.13	.68	.89	1.00

interview and phone techniques. While phone surveys are effective, they may cause participants to answer in more socially appropriate ways than they would if answering in a more confidential way.

As such, the purpose of the current study is to administer a Likert-type, self-report survey consisting of the original (Snortum & Berger, 1989; Berger & Marelich, 1997; Marelich, Berger, & McKenna, 2000) 30 phone interview items in an online format. Data were collected for a larger study (see Kraha & Boals, 2010) concerning vehicle purchases. However, the current study is concerned only with the structure of the Drinking and Driving scale, and will thus focus on those analyses. From there, the data will be randomly split into two Subsamples to (1) provide an exploratory factor analysis to explore the factor structure and (2) provide a confirmatory factor analysis on the exploratory factor analysis from (1).

Method

Participants

Participants consisted of 785 university students who participated for partial course credit in a psychology class. Of the 785, 754 (29.8% male) completed all measures included in the current study. The mean age was 20.65 (*SD* = 4.02) with a range of 17-55. While the mean age is below the legal drinking age in the United States, this is not believed to cause a problem due to the large number of college students that begin drinking before the age of 21 (Wechsler, Lee, Nelson, & Kuo, 2002).

Materials

Drinking and Driving Scale (DDS). Questions for this scale are largely modeled after Snortum and Berger (1989). For validity assessment of the DDS, the sample was randomly divided into two subsamples: Subsample 1 (*N* = 384) and Subsample 2 (*N* = 370). Statistical analyses on the subsamples were carried out in two steps: an exploratory factor analysis on Subsample 1, and confirmatory factor analysis (based on the exploratory factor structure revealed by Subsample 1) on Subsample 2.

Procedure

As part of a mass testing session, participants completed a packet of questionnaires that took approximately one hour to complete. As part of

Table 2

Factor Pattern/Structure Matrix Rotated to the Varimax Criterion

		Factor				
Var		1	2	3	4	h^2
20	During the next year, do you think that at least once you will drive after drinking 3 or 4 drinks in about 2 hours?	**.93**	-.13	.09	-.15	.85
21	During the next year, do you think that at least once you will drive soon after drinking 3 or more drinks in about 2 hours?	**.89**	-.13	.17	-.12	.82
19	During the next year, do you think that at least once you will drive after drinking 1 or 2 drinks in about 2 hours?	**.74**	-.23	.02	-.15	.68
5	Have you ever driven a car after drinking 4 or more drinks?	**.73**	-.13	.08	-.14	.61
3	During the past 12 months, how many times did you drive a car or other vehicle when you had been drinking alcohol or were under the influence of drugs?	**.60**	-.08	.01	-.21	.46
4	Do you drink alcoholic beverages?	**.56**	-.17	-.01	-.13	.50
23	I would feel guilty if I drove intoxicated, even if no one found out.	-.28	**.69**	-.03	.18	.58
24	It is just wrong to drive while slightly intoxicated.	-.36	**.66**	-.01	.32	.66
26	I would be embarrassed if people found out I was arrested (for driving slightly intoxicated).	-.02	**.63**	-.02	.10	.37
29	How much would your feelings of guilt hurt you?	-.11	**.59**	-.14	.11	.50
25	I would lose respect from my loved one(s) if I drove while slightly intoxicated.	-.16	**.58**	-.04	.15	.37
30	How much would lost respect hurt you?	-.06	**.56**	-.10	.08	.46
16	How many traffic accidents have you been in, either as driver or passenger?	-.01	-.07	**.94**	-.01	.70
15	In your opinion, what is the maximum number of drinks that a person your age and build can drink in a two hour period and still be able to drive safely?	.27	-.12	**.78**	-.16	.69
17	How many accidents have you been in where at least one of the drivers had been drinking?	.01	-.09	**.69**	.01	.48
11	Drivers convicted of drunk driving should be jailed on a first conviction.	-.18	.15	-.04	**.78**	.50
12	Drivers convicted of drunk driving should lose their license on a first conviction.	-.24	.19	-.03	**.73**	.52
10	I support random breath testing of drivers for alcohol.	-.12	.22	-.03	**.59**	.38
9	It is morally wrong to drive after 4+ drinks.	-.30	.28	-.06	**.38**	.38
Trace		3.96	2.67	2.06	1.99	10.67
% of variance		20.8	14.0	10.9	10.5	***56.15***

Note. Coefficients greater than |.38| are bold and were retained for that factor. Percentage variance is after rotation, and percentage of variance equals trace divided by the number of variables in our analysis, which is 19. All numbers rounded to two decimal points.

a larger study, participants completed various measures, including the drinking and driving scale and a demographics questionnaire. For full results of that study, see Kraha & Boals (2010). The current study, however, is concerned only with the factor structure of drinking and driving scale—which was not previously reported—and thus is the focus of all analyses.

Results

Exploratory Factor Analysis

The 30 items of the DDS were subjected to maximum likelihood extraction and varimax rotation on Subsample 1 data. Data were examined for suitability of factoring prior to any analyses. Based on examination of the correlation matrix (see Table 1), 11 variables were dropped prior to analysis, resulting in 19 total items to be factored (Items 1, 2, 6, 7, 8, 13, 14, 18, 22, 27, 28). The Kaiser- Meyer-Oklin value was .85, and Bartlett's Test of Sphericity was statistically significant, suggesting suitability for factor analysis.

A minimum average partial analysis (Zwick & Velicer, 1986) was conducted to determine the number of factors to retain. Based on the results of this analysis and results from a parallel analysis (Preacher & MacCallum, 2003), four factors were retained. The rotated solution yielded a simple structure, with all factors showing a number of strong loadings (at 0.38 or above). The four- factor solution explained a total of 56.1% of the variance, with Factor 1 contributing 20.8% (α = .88), Factor 2 contributing 14.0% (α = .82), Factor 3 contributing 10.9% (α = .83), and Factor 4 contributing 10.4% (α = .78). The four factors were named Drinking and Driving Behaviors (Factor 1), Moral Repercussions (Factor 2), Accidents (Factor 3), and Support for Punishment (Factor 4). The resulting four-factor model can be seen in Table 2.

Confirmatory Factor Analysis

To test the validity of the four-factor model found in the EFA, a confirmatory factor analysis was carried out on Subsample 2. The theoretical model provided a good fit to the observed data. The chi square was statistically significant (χ^2 (140, N = 336) = 275.05, p < .01), but this was likely due to the large sample size. Other indices (RMSEA = .05, SRMR = .05, NNFI = .98, CFI = .98, AGFI = .90) point to good model fit. The full model can be seen in Figure 1.

Discussion

The current study built upon a telephone survey by Snortum & Berger (1989) to create a self- report measure of drinking and driving behaviors. An exploratory factor analysis suggested four factors with good reliability, which was confirmed by a confirmatory factor analysis.

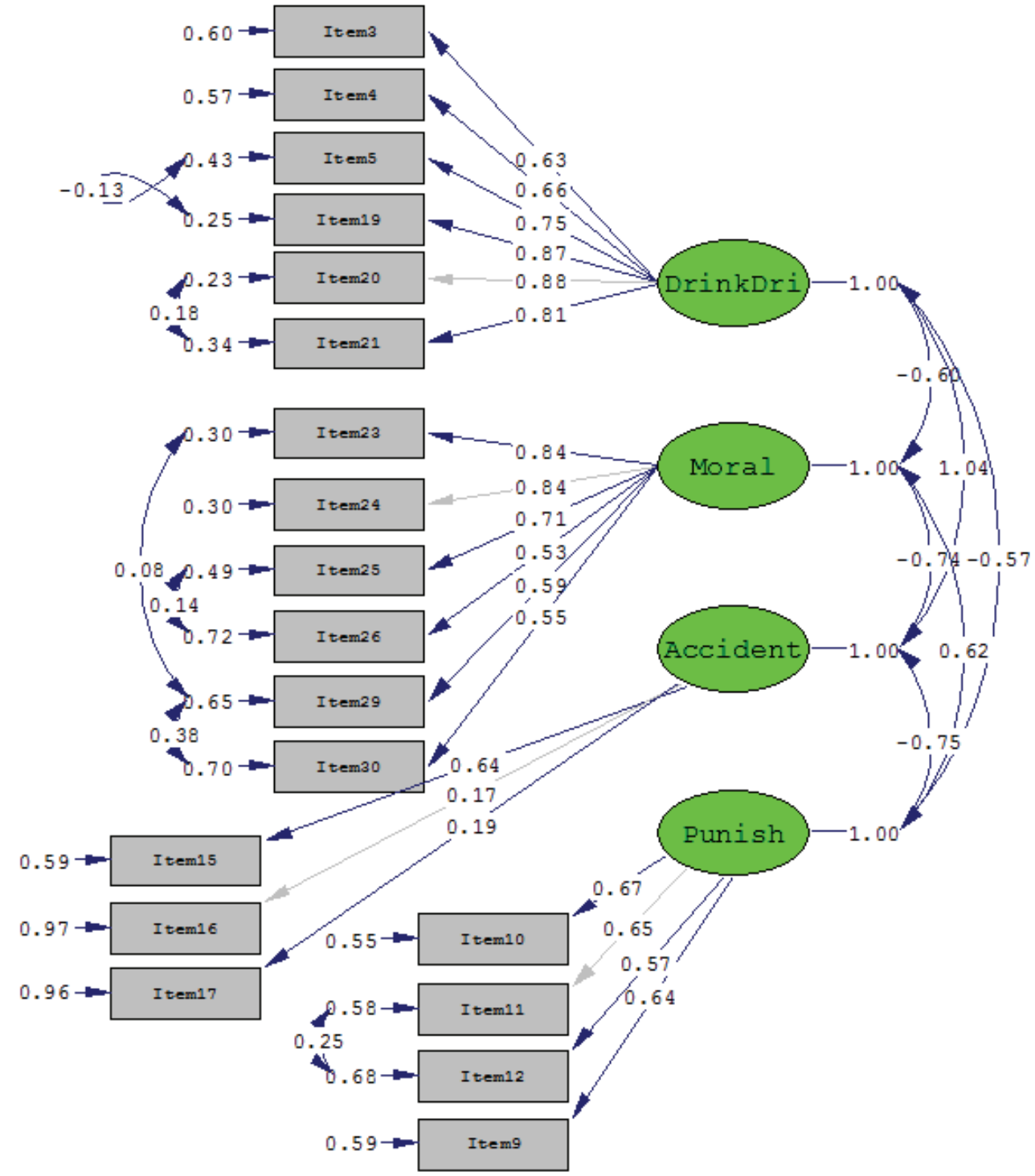
The current study investigated a measure with which to examine these attitudes towards drinking and driving. There are several weaknesses of the current study, including the selection of college undergraduates as a sample. This sample is an important first step in investigating the factor structure of this measure, but future studies should test this factor structure on various samples. The current study provides an important tool because it allows researchers to collect data about these attitudes without having to ask the questions face-to-face, which could affect the validity of data being collected. In addition, the measure can be used to evaluate effectiveness of educational programs addressing the issue of drinking and driving. Given pre- and post – intervention, this measure can highlight changes in attitudes as a result of any of a multitude of education efforts.

Given the large incidence of drinking and driving (Chou et al., 2006) and the high fatality rates of motor vehicle crashes (Arias et al,. 2003), the investigation of attitudes towards drinking and driving is increasingly important. Once baseline attitudes are identified, researchers may then shift focus on methods to change these attitudes further against drinking and driving behaviors.

Unfortunately, likely due to the recognition of drinking and driving as a social problem (Gusfield, 1985) by those in authority, there are many difficulties associated with measuring drinking and driving attitudes. Participants may not wish to disclose true feelings to someone in an authority position (e.g., a university researcher) which could lead to significant measurement error. Because of these difficulties, the current study investigated the factor structure of an online survey designed to provide more anonymously

Figure 1

Confirmatory Factor Analysis on Subset 2 Data



Chi-Square=273.73, df=140, P-value=0.00000, RMSEA=0.051

than its telephone-based predecessor. The measure exhibited good fit for the sample chosen in both exploratory and confirmatory investigations, which supports its use in an online format.

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