



STAGES OF CHANGE AND SELF-EFFICACY FOR CONTROLLING DRINKING AND DRIVING: A PSYCHOMETRIC ANALYSIS

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Abstract — Indicators of self-efficacy and motivation to change (stage of change) with regard to drinking and to drinking and driving were examined in a sample of Driving Under the Influence (DUI) offenders in a court-mandated intervention program. Self-administered questionnaires that contained pertinent measures were completed by 210 consenting offenders (34 of whom were female) during the intervention program. A factor analysis of efficacy and stages of change items showed distinct factors for the respective constructs; however, drinking and drinking-and-driving items of the same type (e.g., efficacy or stages of change) tended to codefine common factors, and the factor pattern suggested that motivations and efficacy for changing drinking behavior are critical for avoiding the drinking-and-driving sequence. Most participants were classified into the action stage in both drinking and drinking-and-driving domains. In regression analysis, contemplation of action and self-efficacy measures pertaining to drinking and driving predicted prior crashes and arrests; however, after accounting for recent alcohol problems, action items pertaining to drinking and driving were the best predictors of recent drinking-and-driving incidents. © 1998 Elsevier Science Ltd

Basic premises of the transtheoretical approach that underlies many modern interventions to change behavior include the necessity for the client (a) to achieve sufficient motivation to change the behavior and (b) to attain a high level of self-efficacy to change the behavior (e.g., DiClemente, Prochaska, & Gibertini, 1985). Interventions often include strategies to enhance both motivation to change and self-efficacy (Miller & Rollnick, 1991). Accurate assessment of efficacy and motivation to change prior to the intervention should help to identify those in need of particular strategies designed to enhance these expectations. At the end of treatment, changes in motivation and in efficacy expectancy should be intermediate indicators of treatment success; degree of motivation to change and self-efficacy at the end of the intervention should be predictors of primary behavioral outcomes that are the targets of the intervention.

Although behavioral change models have been applied in substance abuse and other health-related interventions, measures of motivation to change and of self-efficacy have produced equivocal results as indicators of treatment success and as predictors of behavioral outcomes following intervention (Goldbeck, Myatt, & Aitchison, 1997). Stages of change measures have had predictive value in some studies of dietary habits, such as concurrent fat intake (Glanz et al., 1994), adoption of exercise routines (Armstrong, Sallis, Hovell, & Hofstetter, 1993), and 6-month outcomes of smoking cessation programs (DiClemente et al., 1991). However, stages of change measures failed to predict weight loss after a weight reduction program (Fontaine, Cheskin, & Allison, 1997) and were found to have limited predictive value in methadone maintenance programs with respect to discontinuing use of multiple drugs (Belding, Iguchi,

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& Lamb, 1997) and smoking cessation after brief intervention (Goldberg et al., 1994). Self-efficacy, as measured by an index of confidence to avoid drinking in a variety of situations (i.e., Situational Confidence Questionnaire [SEQ]; Condiotte & Lichtenstein, 1981), has been shown to predict the intended outcome of abstinence at short-term but not at long-term follow-up (Rist & Watzl, 1983). Other studies have found limited predictive value of change in self-efficacy during treatment (Burling, Reilly, Moltzen, & Ziff, 1989). Studies have found either that self-efficacy failed to be significantly related to (e.g., Burling et al., 1989; Rychtarik, Prue, & Rapp, 1992) or was modestly predictive of (e.g., McKay, Maisto, & O'Farrell, 1993) drinking relapse at the end of treatment.

Goldbeck et al. (1997) suggested that the details of the expectancies and motivations that are measured, including the degree of specificity for the targeted outcome, are crucial. Failure to measure outcome-specific expectancies and motivations could be a possible explanation of mixed results when self-efficacy and stages of change measures are used to predict behavioral outcomes of intervention programs. Accurate behavioral prediction requires an equivalence between the expectancy or motivation and the predicted behavior (Sutton, 1989). An example of an inadequate match would be using a measure such as the SEQ, which relates to efficacy for controlling amount of drinking (e.g., heavy drinking) in various situations, as a predictor of total abstinence (Goldbeck et al., 1997). Also, response pressures in particular treatment situations could produce ceiling effects on prediction by expectancies measured during treatment (Goldbeck et al., 1997). For example, clients who are directly or indirectly coerced into treatment may overstate their confidence in their motivation and self-efficacy to achieve the desired outcome, thus reducing the predictive value of these measures (Goldbeck et al., 1997).

Behavioral change strategies such as motivational interviewing (Miller & Rollnick, 1991) have begun to be applied in intervention programs with court-referred offenders of driving under the influence (DUI; Wells-Parker, Burnett, Dill, & Williams, 1997). In such programs, primary outcomes are frequently measured in terms of DUI recidivism or crashes, even though intervention goals and secondary outcomes may focus, at least in part, on reduction of drinking problems, heavy drinking, or even abstinence (Wells-Parker, Bangert-Drowns, McMillen, & Williams, 1995). The context of such DUI intervention programs presents unique situations in which there is a definite source of external coercion into treatment as well as external controls, such a license suspension, on aspects of the behavioral sequence (i.e., drinking and driving) that is targeted for change. The general constructs of motivation to change and self-efficacy appear applicable as interim measures of DUI intervention progress, and the DUI program presents a unique opportunity to test the utility of stages of change and self-efficacy measures in a structure of external controls on both intervention participation and the targeted outcome of drinking and driving. However, no existing motivation to change or self-efficacy expectancy scales incorporate items directly related to avoiding or reducing the sequence of driving after drinking. Furthermore, it is not clear as to the extent to which motivation to avoid future DUIs, or confidence in one's ability to avoid drinking and driving, is a function of efficacy expectancies and motivation to generally avoid episodes of drinking or heavy drinking or to maintain abstinence—all outcomes to which existing control and motivation to change scales pertain.

An earlier study (Wells-Parker et al., 1997) compared a scale of efficacy for controlling drinking and driving to existing drinking control scales that included items denoting personal efficacy to control drinking. The personal efficacy items to control drink-

ing tended to load on the same factor as drinking-and-driving-efficacy items. The pattern suggested that control over drinking is a critical element in personal efficacy to avoid the drinking-and-driving sequence. Factor analysis suggested that personal efficacy was distinct from general beliefs about whether most people could voluntarily avoid heavy drinking and drinking and driving. However, elements of fatalism, or the expectation that regardless of the respondent's level of effort expended to control drinking-and-driving events recidivism was inevitable, emerged as a distinct subfactor from more general drinking and drinking-and-driving-efficacy factors.

The goal of the current study was to examine, in the DUI intervention context, indicators of motivation to change with regard to drinking and driving and to compare them to existing scales that measure motivation to change drinking. The extent to which indicators of motivation to change drinking and driving were independent of motivation to change drinking and of self-efficacy to avoid drinking and driving was examined. Finally, the relationships of efficacy and stages of change to prior drinking-and-driving events were examined after controlling for alcohol problem levels and response bias.

M E T H O D

Participants and procedures

Research questionnaires were given to adjudicated DUI offenders in Mississippi Alcohol Safety Education (MASEP) classes in Gulfport, Hattiesburg, Meridian, Columbus, Philadelphia, Jackson, Canton, Biloxi, Ellisville, Greenwood, and Greenville, Mississippi. Questionnaires of offenders who agreed to participate in the research were matched to intake information collected during the first session.

Of 264 questionnaires that were distributed, 237 were returned and signed for consent to participate. Informed consent procedures that were followed were approved by the Institutional Review Board of Mississippi State University. After questionnaires from the consenting offenders were matched to the standard intake forms that were routinely completed by MASEP participants, personal identifiers were removed. Twenty-three questionnaires could not be matched to intake forms because identifiers did not match or identifiers were illegible, and 11 had entire pages or more than half the questions missing. After deletion of nonmatching questionnaires and questionnaires with excessive missing data, the resulting sample size was 201.

The following scales and items were included in the research questionnaire: (a) Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), (b) Drinking/Driving Efficacy (DDE; Wells-Parker et al., 1997), (c) Locus of Control Over Drinking (DRIE; Donovan & O'Leary, 1978): Factor 1, (d) Stages of Change for Drinking Scales (SCD; Rollnick, Heather, Gold, & Hall, 1992), (e) drinking-and-driving (DRDV) items reflecting motivation to change, and (f) items denoting frequency of drinking and driving, violence, and drinking-related injuries (McMillen, Adams, Wells-Parker, Pang, & Anderson, 1991).

Factor 1 of the DRIE was included because items of this factor reflected personal efficacy to control drinking, and three of the seven items were highly correlated with DDE items in an earlier study (Wells-Parker et al., 1997). An abbreviated version of the SCD (Rollnick et al., 1992) was used because the reported study was conducted as part of a pilot study for a randomized field trial of brief motivational interventions with DUI offenders, and the abbreviated SCD was developed for use in brief intervention modalities. Items reflecting stages of change for DRDV were developed to parallel the stages of change for drinking items in order to evaluate the extent to which mo-

tivations pertaining to drinking and motivations pertaining to drinking and driving are distinct. Four DRDV action items, three DRDV contemplation items, and three DRDV precontemplation items were developed for exploring the interrelationships between drinking and drinking-and-driving motivations. The standard intake form included the Mortimer–Filkins questionnaire (a widely used instrument to measure drinking problems in the context of drinking and driving; Mortimer et al., 1981), a 10-item scale measuring a bias toward socially desirable responding (Wells-Parker et al., 1997), and demographic items.

Women constituted 17% of the sample; 67% were White, 30% were African American, and 3% were of other ethnic backgrounds. Mean age was 34.2 years ($SD = 10.53$), and for the 130 participants whose blood alcohol content (BAC) appeared on the court order, mean BAC was .162 ($SD = .046$). Means on the two drinking-problem indicators, the AUDIT, and the Mortimer–Filkins, were 11.40 ($SD = 7.31$) and 18.70 ($SD = 8.65$), respectively.

R E S U L T S

Factor Analysis

Using cases with complete data for the analyzed scales ($n = 181$), a principal factor analysis with a varimax rotation was performed on items of the DRIE, the DDE, the SCD scales, and the set of DRDV items in order to determine the extent to which efficacy, control, and stages of change tended to define separate factors and whether drinking and drinking-and-driving outcomes related to the same factors or defined separate factors. The analysis revealed nine factors with eigenvalues greater than 1.

For the first factor of the nine, six of eight efficacy (DDE) items loaded above .4 after negatively stated items were reverse scored. Three items from Factor 1 DRIE loaded above .4; two of these items had been highly correlated with the efficacy scale in an earlier study (Wells-Parker et al., 1997). One of the remaining efficacy items and two additional items from Factor 1 DRIE loaded between .35 and .39. The remaining efficacy item, which in an earlier study had defined a separate factor that reflected fatalism about drinking and driving, loaded at .29; the item reflected the belief that, regardless of the respondent's efforts to avoid future incidents, the person would certainly drink and drive again. In general, the first factor reflected efficacy for avoiding drinking and driving and for controlling drinking-related behaviors.

On the second factor to emerge, the two items that loaded above .7 were contemplation items from the SCD. One SCD precontemplation item showed a negative loading of $-.78$. Other items with relatively high loadings ($>.4$) were three or four SCD action items for drinking and one of the remaining SCD contemplation items. Two of the remaining three SCD precontemplation items showed negative loadings ($<-.4$). Several items that defined stages of change over DRDV had moderately high positive or negative loadings on this second factor. DRDV items with positive loadings ($>.4$) included one action item and one contemplation item, and one precontemplation item had a moderate negative loading ($<-.4$). This second factor reflected stage of change over drinking and to a lesser extent over drinking and driving. The factor reflected taking or contemplating action to reduce subsequent incidents and not avoiding action to change. Rather than defining a separate factor, precontemplation items tended to load negatively on this contemplation–action factor.

Some items from the SCD that did not show significant loadings on the second factor might be too complex and confusing for DUI populations that often contain poor

readers. For example, one awkwardly worded item is, "Anyone can talk about wanting to do something about drinking but I am actually doing something about it" (Rollnick et al., 1992, p. 748). This item loaded only .19 on the second factor. Additionally, contemplation items not loading on this factor were items that did not directly reflect contemplation of action but did express a recognition of a drinking problem. Recognition of problem drinking may be different from actual contemplation of action to change. For example, an item that did not load highly was, "My drinking is a problem sometimes" (Rollnick et al., 1992, p. 748). Similarly, precontemplation items that did not load negatively on this factor did not directly express avoidance of action but expressed the belief that there was no drinking problem.

Action items for both drinking (SCD) and DRDV showed the strongest loadings on the third factor. Three of four drinking-and-driving action items (DRDV) and all of the drinking action items (SCD) loaded above .4. The single action item not loading highly (.14) on the factor was an item that was expressed as an attempt to drink and drive less often than in the past.

Factor 4 reflected contemplation of action for both drinking and drinking and driving. All three contemplations for DRDV items and two of four contemplations for drinking (SCD) items loaded above .4.

Items from the DRIE defined the fifth factor. Four DRIE items that had not been highly correlated with the efficacy scale in an earlier study loaded above .45 on this factor. The three DRIE items that had been highly correlated with the efficacy scale in the earlier study loaded at .4 or below on this fifth factor but had high loadings on Factor 1 on which most efficacy items loaded. The pattern of item loadings suggests that the set of items from the DRIE scale is composed of an efficacy component reflected by the items loading on Factor 1 and an affinity for drinking component, which is reflected in Factor 5. An example of an efficacy item from the DRIE (Donovan & O'Leary, 1978) indicated a loss of will power after drinking was started. A DRIE item that reflected affinity for drinking indicated an inability to feel good without drinking (Donovan & O'Leary, 1978).

Factor 6 was a precontemplation factor with two of three DRDV precontemplation items and one drinking (SCD) contemplation item loading above .4.

Factors 7 and 8 were less well delineated, with the highest loading on Factor 7 being an SCD precontemplation item ("Drinking less would be pointless"; Rollnick et al., 1992, p. 748). The single item with a higher negative loading (-.74) on Factor 8 was an SCD precontemplation item: "I don't think I drink too much" (Rollnick et al., 1992, p. 748). The single item with a high positive loading (.62) on Factor 8 was also an SCD precontemplation item: "My drinking is a problem sometimes" (Rollnick et al., 1992, p. 748). Factors 7 and 8 seem to reflect not seeing drinking as a problem and denial of drinking problems.

Factor 9 involved a high loading (>.45) on a single DRDV action item that indicated current attempts to drink and drive less often. The item could be a poor or ambiguously worded item and could be a candidate for deletion from the DRDV scale. Responses to this item could also be affected by the fact that offenders were under revocation and were not supposed to be driving.

Scale analysis

An analysis of the reliability of efficacy and stages of change measures and item subsets that pertained to drinking and to drinking and driving was conducted. Excluding

Table 1. Alphas for composite efficacy scale and stages of change subscales

Scale	Item	Alpha	Standardized Alpha	<i>n</i>	Mean (<i>SD</i>)
DDE + 3 DRIE items ^a	11	.85	.85	186	4.0 (.72)
SCD ^b	12				
Action	4	.83	.83	188	4.0 (.93)
Contemplation	4	.74	.74	191	3.4 (.98)
Precontemplation	4	.49	.51	187	2.5 (.78)
DRDV	11				
Action	4	.67	.68	187	4.2 (.77)
Contemplation	3	.63	.62	187	3.5 (1.0)
Precontemplation	3	.45	.46	181	2.3 (.85)

Note. Higher scores denote higher expectancies. The combined DDE is correlated with the scale of socially desirable response set ($r = .29, p < .01$). For stages of change subscales, only one (SCD Contemplation) was significantly correlated with socially desirable response set ($r = .22, p < .01$). The DRIE and the AUDIT were also correlated ($p < .01$) with socially desirable response set ($r_s = .22$ and $.27$, respectively). DDE = Drinking/Driving Efficacy; DRIE = Locus of Control Over Drinking; SCD = Stages of Change for Drinking; DRDV = Drinking and Driving; AUDIT = Alcohol Use Disorders Identification Test.

^aReliabilities were calculated for the combination of the DDE that was developed in the original study with the three items from the DRIE that were highly intercorrelated with the DDE and reflected efficacy over drinking-related events in general. This combination is hereafter called the DDE/3.

^bFor comparability to efficacy scales, scores and means for SCD are on a 1–5 scale, which is a simple arithmetic transformation (i.e., by the addition of the number 3) of the Rollnick, Heather, Gold, and Hall (1992) scoring system that ranged from –2 to 2.

cases that could not be matched to demographic data¹ and using listwise deletion of missing data, the alphas that are shown in Table 1 were obtained.

Scale intercorrelations

Interrelationships among scales were examined with simple correlations that are reported in Table 2. The combined efficacy measure (DDE/3) for controlling drinking and driving and general drinking outcomes was highly related to the AUDIT, which is a measure of current drinking levels and drinking problems. SCD action and DRDV action were highly intercorrelated (Table 2), suggesting that taking action to control drinking and to control drinking and driving were highly interrelated. Similarly, SCD contemplation and DRDV contemplation were highly intercorrelated (Table 2). Significant correlations were shown between SCD precontemplation and DRDV precontemplation. As expected in regard to stages of change subscales, action and contemplation measures were positively correlated, and contemplation and precontemplation measures were negatively correlated. The action measures tended to be negatively correlated with precontemplation measures; however, the correlation between DRDV action and DRDV precontemplation, which reflects denial of drinking-and-driving problems, failed to attain significance ($p > .01$). The context in which the questionnaire was administered, including the fact that clients were under license revocation, could attenuate the relation of items expressing current action not to drink and drive and acknowledgement of a problem with drinking and driving. In this vein, the DDE/3

¹When the additional 23 cases that could not be matched to intake data were included in the reliability analysis, alphas went up slightly for all but the efficacy scale, for which alpha declined to .65. These results are probably meaningless because on several unmatched questionnaires there was a tendency to mark a single answer (e.g., 5) on the entire questionnaire or whole pages of the questionnaire. Such response patterns would be related to a lower alpha for efficacy because it is the only scale in the set involving items that must be reversed for proper scoring.

Table 2. Correlations among variables

Scale	1	2	3	4	5	6	7	8
1. AUDIT	1.0	-.05	.37*	-.21*	.04	.46*	-.21*	-.49*
2. DRDV (ACT)		1.0	.36*	-.14	.69*	.34*	-.30*	.25*
3. DRDV (CON)			1.0	-.33*	.34*	.70*	-.41*	-.25*
4. DRDV (PRE)				1.0	-.23*	-.29*	-.47*	.02
5. SCD (ACT)					1.0	.44*	-.36*	.12
6. SCD (CON)						1.0	-.55*	-.28*
7. SCD (PRE)							1.0	.06
8. DDE/3								1.0

Note. AUDIT = Alcohol Use Disorders Identification Test; DRDV = Drinking and Driving; SCD = Stages of Change for Drinking; DDE = Drinking/Driving Efficacy; DRIE = Locus of Control Over Drinking; ACT = Action subscales; CON = Contemplation subscales; PRE = Precontemplation subscales; DDE/3 = a combination of the DDE scale with three self-efficacy items from the DRIE.

* $p < .005$.

measure that reflects efficacy to avoid drinking and driving showed an unexpected negative correlation with DRDV contemplation: Those with higher efficacy expectancies for avoiding drinking and driving were less likely to be contemplating actions to avoid drinking or drinking and driving; however, efficacy showed the expected positive relationships to action scales, which reflect current actions to avoid drinking and driving.

Stage of change and profile classification

Using classification strategies from an earlier study (Rollnick et al., 1992), participants were assigned to stage and to profile categories. Both stage and profile assignments were made separately for the drinking and for the drinking-and-driving domains. Participants could be assigned either to precontemplation, contemplation, or action stages based on the highest stage score. An earlier study (Rollnick et al., 1992) identified eight profile patterns based on whether stage scores were elevated above a neutral stage score on each of the three stages. Thus, a positive stage elevation represented, on average, agreement or strong agreement with the stage indicators, and a negative stage score represented, on average, disagreement or strong disagreement with the stage indicators. Using the eight-pattern protocol, three pure patterns (pure action, pure contemplation, and pure precontemplation) represented elevations on the single-stage scale to which the participant was assigned. Two consistent/mixed patterns (precontemplation/contemplation and contemplation/action) involved elevations on two adjacent stage scales. One inconsistent/mixed pattern (precontemplation/action) involved elevation on two nonadjacent stage scales. Also two ambiguous patterns involving either elevation on all three scales or no elevations on any of the three scales were identified.

In the drinking-and-driving domain, 25 participants (12%) had missing data for at least one stage. Of the 176 remaining participants, only 6 (3%) were assigned to the precontemplation stage using the highest stage score; 36 (20%) were assigned to contemplation; 115 (65%) were assigned to action. Approximately 11% had as their highest scores tied scores on two scales. Had these remaining participants been assigned to the most advanced stage when the tied scores were between two adjacent stages, two additional participants would have been assigned to contemplation and 14 additional participants (8%) to action. Three additional participants showed inconsistent tied scores between action and precontemplation (inconsistent for stage classification). No

participants tied on all three drinking-and-driving stage scales. Clearly, most participants were classified into the drinking-and-driving action stage, and very few were classified as precontemplators, suggesting that a drinking-and-driving event was generally associated with acknowledgment of a problem with drinking and driving and some attempt at correction.

Regarding drinking-and-driving stage profiles, 50 participants (28%) had a pure pattern with a single score elevation. Most (36) pure pattern profiles were for those participants who were classified in the action stage (i.e., actors). Most participants (98 or 56%) showed mixed consistent patterns with elevations on two adjacent stages. Of participants with mixed/consistent patterns, all but 1 (97 of 98) showed elevations on contemplation and action with no elevation on precontemplation. When drinking-and-driving stage was examined by pattern assignment, most (4 of 6) precontemplators showed a pure pattern, with the two remaining precontemplators showing the inconsistent pattern of elevation on the action and precontemplation stages. Most contemplators and actors showed a mixed consistent pattern. Twenty-two (66%) of 36 contemplators and 65 (57%) of 115 actors showed elevations on both contemplation and action stages. Fewer contemplators (10 or 28%) and fewer actors (36 or 31%) showed pure patterns. Only 18 (12%) actors and contemplators showed inconsistent or ambiguous patterns.

Drinking stages and profiles were similar to those found for the drinking-and-driving domain. Data were missing on at least one drinking stage for 24 participants. Of the 177 remaining participants, most (103 or 58%) were classified as actors, 28 (16%) were classified as contemplators, and 22 (13%) were classified as precontemplators. Twenty-four participants (14%) had highest tied scores. Had participants with two adjacent highest tied scores been assigned to the most advanced stage for the ties, 1 additional participant would have been classified as a contemplator and 19 additional participants (11%) would have been classified as actors. Only 3 participants had tied scores on the nonadjacent action and precontemplation stages, and 1 additional participant tied on all three stages.

When drinking stage profiles were examined, most of the 22 drinking precontemplators (14 or 63%) had pure patterns, with the remaining 6 showing no elevation on any stage score above a neutral rating. Most (17 or 61%) of 28 contemplators, most (57 or 55%) of 103 actors, and 18 stage ties showed the consistent/mixed pattern of elevations on both contemplation and action stages. Only 19 (13%) of classified contemplators and actors showed inconsistent or ambiguous patterns. As in the drinking-and-driving domain, most participants were classified as actors with respect to drinking stage, and most showed elevations above a neutral score on both contemplation and action stages. However, almost four times as many participants were classified as drinking precontemplators (22) as compared to drinking-and-driving precontemplators (6).

Stages across domains were compared for the 167 participants with no missing stage data. When stages were cross-tabulated across drinking and drinking-and-driving domains, 59% of participants were classified into the same stage for both domains. Seventy-six (66%) of 115 drinking-and-driving actors were also classified in the action stage for drinking; 16 (44%) of 36 drinking-and-driving contemplators were classified as drinking contemplators; all 6 drinking-and-driving precontemplators were classified as drinking precontemplators. Seventeen (15%) of 115 drinking-and-driving actors were drinking contemplators or tied between contemplation and action on drinking; 12 (10%) drinking-and-driving actors were drinking precontemplators; 16 (44%) of 36

drinking-and-driving contemplators were drinking actors or tied between drinking action and contemplation stages; and 2 drinking-and-driving contemplators were drinking precontemplators. Thus, the most common across-domain stage discrepancy was for drinking-and-driving actors to be classified as drinking contemplators or precontemplators.

Stage by drinking problem indicators

Three indicators of problem drinking—the AUDIT, the Mortimer–Filkins, and BAC—were available for examination by stage. The same consistent patterns tended to emerge within both the drinking and the drinking-and-driving domain (Table 3), although missing BAC data reduced cell sizes and precluded meaningful statistical comparisons of BACs by stage.

The lowest problem scores were found for the precontemplation stage (Table 3). On most indicators, problem scores for the contemplation stage tended to be higher than problem scores for the action stage. When AUDIT mean scores for the action stage were contrasted with corresponding scores for the contemplation stage, the contemplation scores were higher in both drinking and drinking-and-driving domains (Table 3). When AUDIT scores for the precontemplation stage were contrasted with corresponding scores for the two higher stages, precontemplation scores were lower in both domains. A similar pattern emerged when Mortimer–Filkins scores were substituted for AUDIT scores as problem indicators; however, the contrast between the Mortimer–Filkins mean score for precontemplation and the mean score for the higher two stages failed to attain statistical significance ($p > .05$) in the drinking-and-driving domain (Table 3). Generally, the most common pattern of drinking problems across stages was for precontemplators to have the lowest problem scores and contemplators to have the highest problem scores for any stage.

Concurrent prediction of drinking-and-driving events

An indicator of concurrent criterion validity is the extent to which scales predict current and past drinking or drinking-and-driving behaviors. Using cases with com-

Table 3. Drinking and drinking-and-driving stages by drinking problem means

	AUDIT			M/F			BAC		
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
DRDV ^a									
ACT	10.36	7.01	107	17.09	8.37	108	.157	.041	76
CON	15.76	8.34	34	23.39	9.19	31	.172	.051	23
PRE	6.67	3.32	6	14.80	6.72	5	.141	.044	3
Drinking ^b									
ACT	10.20	7.28	93	17.71	8.53	96	.163	.048	70
CON	17.59	6.79	27	24.68	7.57	25	.161	.043	7
PRE	8.23	3.66	22	15.05	7.89	19	.140	.026	10

Note. AUDIT = Alcohol Use Disorders Identification Test; M/F = Mortimer–Filkins questionnaire; BAC = blood alcohol content; ACT = Action subscales; CON = Contemplation subscales; PRE = Precontemplation subscales.

^aContrasts: CON versus ACT, AUDIT $t(139) = 3.81, p < .01$, and M/F $t(137) = 3.68, p < .01$; PRE versus CON/ACT; AUDIT $t(145) = 2.11, p < .05$, and, M/F $t(142) = 1.41, p > .05$.

^bContrasts: CON versus ACT, AUDIT $t(118) = 4.97, p < .01$, and, M/F $t(119) = 3.77, p < .01$; PRE versus CON/ACT; AUDIT $t(140) = 5.22, p < .01$, and, M/F $t(138) = 2.91, p < .01$.

plete data for the included variables, stepwise multiple regression analyses were used to examine the concurrent criterion validity of the combined DDE/3, the DRIE, and the various stages of change subscales by determining whether each scale was a significant predictor of concurrent self-reported drinking and drinking-and-driving behaviors. The measure of socially desirable responding was forced to enter all regression equations so that relationships of efficacy and the stage of change scales to behavioral measures were determined after controlling for response bias; however, for simplicity, the bias measure was deleted from the final model if its coefficient failed to attain statistical significance and its inclusion did not alter coefficients for primary variables. Additional regression analyses included the Mortimer–Filkins and the AUDIT as well, in order to determine whether efficacy and stages of change were behavioral predictors after accounting for standard measures of alcohol problems. For self-reported frequency of driving after five or more drinks during the last 2 weeks, efficacy was the best and only significant predictor ($\beta = -.30$, $R^2 = .091$), $F(1, 150) = 15$, $p < .01$, prior to entry of the alcohol problems indicators. However, when the alcohol indicators were added, the AUDIT ($\beta = .37$, $t = 2.84$, $p < .01$) was the best predictor, with DRDV action ($\beta = -.22$, $t = -.37$, $p < .01$) also entering ($R^2 = .18$), $F(2, 140) = 15.24$, $p < .001$.

For self-reported driving over the legal limits within the past year, the AUDIT ($\beta = .46$, $t = 6.22$, $p < .01$) was the only significant predictor after accounting for response set ($R^2 = .32$), $F(2, 140) = 32.8$, $p < .001$.

Although participants were adjudicated as first offenders, many actually had prior DUIs. When self-reported prior DUIs were used as a criterion, the Mortimer–Filkins ($\beta = .30$, $t = 3.57$, $p < .01$) was a significant predictor, and the DRDV contemplation of change subscale ($\beta = .17$, $t = 2.0$, $p < .05$) was a marginally significant predictor ($R^2 = .15$), $F(2, 139) = 12.1$, $p < .001$. Regarding number of self-reported accidents within 1 hr of drinking, only the DDE/3 was a significant predictor ($\beta = -.2$, $t = 2.48$, $p < .01$) after controlling for response bias ($R^2 = .13$), $F(2, 149) = 10.43$, $p < .001$, and DDE/3 remained the best predictor and the only variable to enter the equation even when the AUDIT and the Mortimer–Filkins were available for entry. Thus the AUDIT was the best predictor of recent (i.e., past year or 2 weeks) reports of drinking and driving, with low action for changing drinking and driving also predicting very recent drinking-and-driving frequency (i.e., past 2 weeks). Alternatively, when cumulative (ever happened) incidents were reported, either Mortimer–Filkins (for DUI arrests) or DDE/3 (for accidents after drinking) was the best predictor. AUDIT questions reflect recent drinking behaviors, whereas the Mortimer–Filkins evaluates cumulative, lifelong, and early problems. The measure of efficacy for controlling drinking and driving (i.e., DDE/3) may reflect an enduring expectancy, and it is notable that efficacy (low efficacy for avoiding drinking and driving) was the best predictor of prior accidents after drinking.

DISCUSSION

The current study explored both self-efficacy expectancies and motivations to change for both drinking and drinking and driving. Motivations for changing drinking-and-driving behavior have not been examined previously. As expected, personal efficacy and motivation to change (as measured by stages of change indicators) were shown to be distinct from each other; however, the drinking and drinking-and-driving domains were highly interrelated for both self-efficacy and for stages of change. Personal efficacy for avoiding drinking and driving was closely related to personal effi-

cacy for controlling drinking, especially heavy drinking and drinking problems. Items of personal efficacy to control drinking loaded on the same general factor as items pertaining to personal efficacy to avoid future drinking-and-driving incidents. However, several drinking-and-driving efficacy items reflected a fatalistic attitude toward drinking and driving and tended to define a separate factor to more general drinking and drinking-and-driving efficacy expectancies: Such a fatalistic attitude could be further examined as an independent predictor of subsequent drinking-and-driving events. The findings regarding the factor structure of efficacy expectancies essentially replicated results from an earlier study (Wells-Parker et al., 1997).

Regarding motivation to change behavior, the factors that emerged in the current study differed somewhat from factors emerging in studies of stages to change drinking behavior (Rollnick et al., 1992). A bipolar factor represented primarily by contemplation and action items (positive loadings) and precontemplation items (negative loadings) emerged instead of a separate precontemplation factor. The bipolar factor appeared to represent low denial of drinking problems and, to a lesser extent, drinking-and-driving problems with an openness to contemplation of changing drinking and drinking-and-driving behaviors. Several issues could account for discrepancies between the earlier study and the current study. Internal consistency alphas for precontemplation measures in the current study were lower than those in a previous study of drinking stage of change (Rollnick et al., 1992); both drinking and drinking-and-driving items were included in the current analysis, whereas only drinking items were included in the previous study. Moreover, the sample of the present study was drawn from a Mississippi DUI population, whereas the sample of the earlier study was drawn from hospital patients in Australia. In the current study, drinking and drinking-and-driving items tended to codefine both the action and the contemplation factors; thus, items that denoted contemplating actions to avoid drinking and driving tended to load on the same factor as items that denoted contemplating actions to solve drinking problems, and action items for successfully avoiding drinking and driving tended to load on the same factor as action items for solving drinking problems. The interrelationships between the drinking and the drinking-and-driving domains were further illustrated by the fact that correlations between two action measures and between the two contemplation measures either approached or exceeded the internal consistency (alphas) for several of the measures.

When stage of change was determined, there was notable consistency across domains with a high correspondence between contemplation or action stages for drinking and contemplation or action stages for drinking and driving. That is, participants tended to be assigned to the same stage for drinking and for drinking and driving. The most notable exception to the general correspondence of stages across domains was that about 7% of participants were in the contemplation or action stage for drinking and driving but in the precontemplation stage for drinking. Indeed, when stages were inconsistent across domains, drinking-and-driving stages usually exceeded drinking stages. Among the motivational measures, the drinking-and-driving action and contemplation measures were the best predictors of prior or recent drinking-and-driving events. Although the factor and correlational analyses show high correspondence across domains for the motivational measures and suggest that motivation for changing drinking behavior is integral to motivation for avoiding the drinking-and-driving sequence, there may be utility in maintaining separate measures for the domains in terms of prediction of future drinking-and-driving events. Ongoing studies that collect stage measures and recidivism over time will examine the two approaches.

In the current study, the least common stage classification in both domains was precontemplation, with a larger proportion classified as drinking precontemplators than as drinking-and-driving precontemplators. True social drinkers who were simply unlucky on the one occasion when they exceeded the legal limit would most likely be classified as drinking precontemplators, which would be consistent with the current finding that precontemplators had the lowest drinking problem scores of any stage. However, some social drinkers might be planning or actively taking steps to avoid future DUIs, which would be consistent with action in the drinking-and-driving domain. There is an ongoing debate regarding the extent of social or “nonproblem” drinking within the DUI population (e.g., see Wells-Parker, Cosby, & Landrum, 1986). Such “social drinkers” could require different strategies of altering drinking-and-driving behavior from strategies for offenders with drinking problems (see Wells-Parker et al., 1995). The low percentages of precontemplators suggest that social drinkers are rare among DUIs. Further study of precontemplators within the DUI population could enlighten the debate regarding the existence within DUI populations of social drinkers as well as their long-term risk of moving into problem drinking patterns. However, drinking precontemplators also could include offenders who are in denial of real drinking problems but who might also, in many cases, believe that they can act to avoid future DUI events by changing other patterns of behaviors. It is notable that few participants (less than 4%) in the sample were classified as being in the precontemplation stage for drinking and driving. Apparently, the event of receiving a DUI is sufficient for most offenders to at least contemplate changing elements of the drinking-and-driving sequence.

In contrast to an earlier study using the SCD in a different population (Rollnick et al., 1992), most participants in the current study were classified as actors in both domains. The higher percentage of action classifications in the current study could relate to the fact that participants were under license suspension and might have been focusing on reducing or avoiding driving episodes (Wells-Parker & Cosby, 1988), thus reducing or avoiding DUI events. It is possible that the DUI event was sufficiently traumatic and costly, resulting in at least some attempt to act to reduce future drinking-and-driving risks. However, many of the DUI offenders also were classified as actors in the drinking domain, suggesting that attempts to reduce or avoid drinking episodes and problems were part of the behavioral changes that were being attempted. Additionally, the context of a mandatory intervention program could produce a tendency to overestimate motivations and expectancies (Goldbeck et al., 1997). Given the high proportion of actors at the beginning of the intervention process when the questionnaires for the current study were administered, regression to lower stages could occur over the course of the program or over time as the suspension is lifted and the DUI event becomes more remote. Earlier discussions of stage of change models (Prochaska, DiClemente, Velicer & Rossi, 1992) have identified those who “leap” to action without passing through the process of contemplation and planning change as being at high risk of relapse. A potentially traumatic event such as a DUI arrest could result in such a leap without preparation. About 30% of drinking-and-driving actors showed a pure action pattern with no elevation of the contemplation measure; these pure pattern actors could represent “leapers” at high risk of relapse. Examination not only of stage classifications but also of subgroups within stages (e.g., pure vs. multiple elevation patterns, consistent stage patterns across domains vs. inconsistent stage patterns across domains) could be more useful than simple stage classifications for DUI offenders, especially when attempting to evaluate intervention success or to predict drinking-and-driving outcomes.

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