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Development and Validation of the Alcoholics Anonymous Intention Measure (AAIM)*

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Abstract

Background—Drop-out from 12-step groups is notoriously high, yet the field lacks strong models and scales for addressing this problem. We aim to determine whether the theory of planned behavior (TPB) can be applied to 12-step involvement, and to develop and validate a scale of 12-step readiness based on that theory: the Alcoholics Anonymous Intention Measure (AAIM).

Method—Data were from a longitudinal trial of a manual-guided 12-step facilitation intervention called Making AA Easier (MAAEZ) involving 2 treatment programs in California (N=508). Participants completed surveys at baseline, 7 weeks, 6 months, and 12 months. Surveys included the preliminary AAIM, a 12-step involvement measure, other readiness measures, and substance use outcomes.

Results—The final, 17-item AAIM measured attitudes (5-item α 's=.75-.83), subjective norms (4-item α 's=.56-.81), perceived control (5 item α 's=.78-.85), and intentions (3-item α 's=.80-.95) regarding attendance at 12-step groups. Components were correlated with each other and other readiness measures as expected, supporting the AAIM's validity. Scale components predicted 31% of the variance in Intention to attend 12-step groups at 6 months and 41% of the variance in 12-step involvement at 12 months. Social factors were among the strongest predictors of 12-step involvement. Results did not support the expectancy-value formulation of the TPB, as unweighted (vs. weighted) belief items performed optimally.

Conclusions—Results generally support the TPB as a model of 12-step involvement and suggest specific targets for 12-step facilitation interventions within attitude, norm, and control components. Findings also support the AAIM as a tool for identifying drop-out risks and tailoring individual interventions.

Keywords

Alcoholics Anonymous; 12-step; treatment readiness; drop-out; theory of planned behavior; scale

1. Introduction

Drop-out from 12-step groups is a notorious problem in substance abuse treatment as it severely limits the effectiveness of these groups and, hence, treatment. The problem remains because

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we still know little about 12-step affiliation. The current study examines whether 12-step involvement—defined here as involvement in 12-step groups for the addictions, such as AA and NA—can be modeled using the theory of planned behavior (TPB; Ajzen, 1991; Ajzen, 1985), a general, psychosocial model of human behavior. Specifically, the study 1) develops and validates a scale of 12-step readiness based on the TPB, and thereby 2) identifies a core set of psychological factors that affect 12-step involvement. The study thus contributes a *theoretical framework* for understanding 12-step readiness and a psychometrically valid *scale* useful for identifying drop-out risks and potential points of intervention.

1.1 Side-stepping 12-step Groups

Countless studies show that individuals who become involved in 12-step groups during treatment show better substance use outcomes post-treatment (Emrick et al., 1993; McCrady and Miller, 1993; Tonigan et al., 1996). Further, emerging evidence suggests that self-selection biases cannot account for the relationship between 12-step involvement and treatment outcomes (Humphreys et al., 1996; Ye and Kaskutas, in press). This implies that, although many individuals may recover without becoming involved in 12-step groups or formal treatment (Godlaski et al., 1997), individuals seeking treatment typically benefit from 12-step involvement. Yet, drop-out is high both in the general population and among severe treatment populations (Kaskutas et al., 2005; Kaskutas et al., 2008; Kelly, 2003; Kelly and Moos, 2003; Kelly et al., 2006; McIntire, 2000). Interventions aiming to increase 12-step involvement have shown success in doing so, but even in such contexts, a small minority of participants have sustained attendance at levels where benefits can be expected (Cloud et al., 2006; Kahler et al., 2004; Timko et al., 2006). For example, participants in Project MATCH's Twelve-Step Facilitation (TSF) condition, who were exposed to 12 sessions explaining the 12-step philosophy and encouraging involvement, showed irregular attendance even in the first 6 months following treatment; only 37% attended weekly or more (Cloud et al., 2006).

Work on the psychological factors related to 12-step involvement has been sparse, and as yet, has produced no theoretically-grounded models (Cloud and Kingree, 2008). Still, there are now several scales describing 12-step motivation. One example is the 15-item Survey of Readiness for AA Participation (SYRAAP, Kingree et al., 2007; Kingree et al., 2006), assessing Perceived Severity, Perceived Benefits, and Perceived Barriers, with alphas $> .71$ (scale alpha = .85-.88). In one treatment study, the SYRAAP was a stronger predictor of subsequent AA involvement than were sociodemographic variables, problem severity, psychological distress, and overall stage of change, and predicted AA involvement even controlling for prior AA (Time 2 Beta = .25, $p < .01$; Time 3 Beta = .24, $p < .01$). Another important scale is the 36-item Twelve-Step Participation and Expectancies Questionnaire (TSPEQ; Kahler et al., 2006), including 10 subscales with alphas of .60-.87. Total score on the TSPEQ significantly predicted AA/NA involvement during a 6-month treatment follow-up, though it is not clear how strongly as the effect size was not reported. A third scale is the Negative Aspects of Twelve-Step Groups Scale (NATSGS; Laudet, 2003), which has not yet been used predictively. Other scales include the Twelve-step Ambivalence Scale (Cloud and Kingree, 2008) and the REASONS scale (Kelly et al., 2006).

1.2 Using the Theory of Planned Behavior (TPB) to Model 12-step Involvement

Current scales have made important inroads into understanding readiness to attend 12-step groups. However, there remains a need for a valid scale of 12-step readiness because none of the existing scales, with the exception of the SYRAAP, has been shown to be a strong predictor of subsequent 12-step involvement. (Likewise for general treatment readiness scales.) Moreover, none of the scales, including the SYRAAP, fully captures the independent influence of 3 important contributors to human behavior: that is, attitudes, subjective norms, and perceived control regarding the behavior (discussed below). Existing scales have

overwhelmingly focused on attitudinal factors, meaning the individual's *evaluation* of 12-step groups and the perceived consequences of attendance. Scales have also included global and miscellaneous factors that would seem to be only indirectly related to 12-step involvement, if at all, and that should thus be relatively weak predictors of the same (see Ajzen, 2005, on the principle of compatibility). For example, several scales have included items on perceived problem severity, although problem severity should impact involvement only via one's attitude toward involvement. We believed we could improve on existing scales by separately and systematically measuring (only) individuals' attitudes, norms, and perceived control regarding 12-step involvement. We designed our scale with the goal of measuring specific factors that would both predict involvement and be amenable to intervention.

Our scale is explicitly based on the theory of planned behavior (TPB; Ajzen, 1991; Ajzen, 1985). The TPB is a general, powerful, and parsimonious model that has been successfully used in hundreds of independent studies (Armitage and Conner, 2001). Godin and Kok (1996), reviewing 56 studies in the health domain (i.e., on behaviors related to the addictions, eating, exercising, oral hygiene, HIV/AIDS, automobile use, and screening and treatment compliance), reported an average $R^2=.41$ for the prediction of intention and .34 for behavior; models predicting addictive behaviors showed an even higher $R^2=.45$ for intention and .41 for behavior (p. 93). The TPB has been used successfully to model alcohol-related outcomes among youth, young adults, and adults (Armitage et al., 1999; Conner et al., 1999; Marcoux and Shope, 1997; Wall et al., 1998) and can predict heavy drinking among problem and nonproblem drinkers alike (Schlegel et al., 1992).

The TPB proposes that a given behavior can be predicted from the individual's *intention* to engage in that behavior; intentions are, in turn, predicted by one's *attitude*, *subjective norm*, and *perceived behavioral control* regarding the behavior. One's *attitude* reflects the degree to which performance of a behavior is positively or negatively valued. Following expectancy-value theory (Fishbein and Ajzen, 1975), this construct is calculated as the sum of the total set of accessible behavioral beliefs (i.e., beliefs about the likelihood of various outcomes), each weighted by its subjective value. For example, common expectations surrounding exercise may involve the potential for weight loss, increased strength, expense, and pain. If so, individuals who believe that weight loss and increased strength are likely and desirable, and who believe that high expense and pain are unlikely and/or of minimal consequence, will show the most positive attitudes toward exercise. The *subjective norm* component reflects the social pressures surrounding a behavior. In parallel with the expectancy-value formulation of attitudes, the subjective norm is calculated as the sum of the total set of accessible normative beliefs (i.e., beliefs about the expectations of important referents), each weighted by the subjective importance of complying with the referent. For example, important social referents typically involve one's family, friends, and coworkers. If so, individuals who believe that their family, friends, and coworkers want them to exercise, and who value the opinions of those groups, will show the most favorable subjective norms regarding exercise. *Perceived behavioral control* refers to the perceived ease or difficulty of performing a behavior. This construct is calculated as the sum of the total set of accessible control beliefs (i.e., beliefs about the presence of factors that may facilitate or impede the behavior), each weighted by the perceived power of the factor. In our example, common factors facilitating exercise may involve access to a car and unoccupied evenings. Assuming so, individuals who have both access to a car and unoccupied evenings, and who count these factors as important to their exercise, should have the highest perceived control over exercising. Because it reflects actual as well as subjective control, perceived behavioral control is a direct predictor of behavior as well as a predictor of intention. A potential advantage of the TPB in the prediction of behavior is that the theory allows for weighting of all attitudinal, normative, and control factors proportional to their subjective importance.

We developed and validated our scale, called the AA Intention Measure (AAIM), using data from a longitudinal clinical trial of a 12-step facilitation intervention. Another paper has examined trial outcomes (Kaskutas et al., 2008) and a subsequent paper, building on the current work, will examine the impact of the intervention on the AAIM's components.

2. Methods

2.1 Sample and Study Sites

A complete description of the sample, sites, and design can be found in Kaskutas et al. (in press). Participants were recruited from July 3, 2005 through May 5, 2006. All clients entering treatment at the participating sites were eligible; no exclusion criteria were used. Sites admitted only individuals over 18 with a current abuse or dependence diagnosis, and refused those with incapacitating mental or physical problems. About 83% of eligible clients (N=508) consented to participate and completed baselines (Time 1). Additional interviews were completed for 81% of this initial sample at 7 weeks (Time 2), 75% at 6 months (Time 3), and 76% at 12 months (Time 4). Participants were informed that they would undergo urine screenings at follow-ups.

Two longstanding non-profit treatment programs participated, one each from northern and southern California. The northern site offered day treatment and short- and long-term residential treatment; the southern site provided outpatient and long-term residential treatment. Staffing and program philosophy were similar at both programs. Both programs offer 12-step-oriented group treatment and have roots in the Therapeutic Community method (Troyer et al., 1995); further, both are representative of the mixed-model, hybrid approach to treatment that typifies current community-based programs for alcohol and drug problems (Borkman et al., 2007).

2.2 Design

The study was designed to test the efficacy of a manual-guided 12-step facilitation intervention called MAAEZ (Making AA Easier). MAAEZ consists of 6 weekly 90-minute sessions delivered in group format by counselors who are active members of Alcoholics Anonymous (AA), Narcotics Anonymous (NA), or Cocaine Anonymous (CA). The intervention aims to address the attitudes, normative influences, and control factors conceptualized—according to the theory of planned behavior—to be relevant to 12-step involvement. A quasi-experimental “OFF/ON” design (Campbell and Stanley, 1963) was used to test whether MAAEZ improved client outcomes.

2.3 Measures

2.3.1 The AA Intention Measure (AAIM)—The preliminary AAIM, developed to assess readiness to attend 12-step groups and based on the TPB, was included at all 4 time points. (Note that the AAIM is intended to capture readiness to attend 12-step groups generally, including for example Narcotics Anonymous and Marijuana Anonymous.) Items were informed by a review of the literature and Ajzen's guidelines (Ajzen, 2002).¹

Four separate indices were included. For the *Attitude* component, participants first rated the likelihood of experiencing each of 9 outcomes as a result of attending 12-step groups; next, they rated the desirability of each.² For the *Subjective Norm* component, participants reported

¹The Supplementary Materials (available with the online version of this paper) provide the AAIM's final items, and include all preliminary items except for 4 on attitudes (i.e., questions on the perceived likelihood that the respondent would “have to follow a lot of rules,” “have to become religious,” “have to associate with people you don't like,” and “feel uncomfortable”). These items were dropped as a result of scale analyses, described in the Results.

on the opinions of 4 key referents regarding their attending 12-step groups; then, they rated the subjective importance of complying with each. For the *Perceived Control* component, participants first rated the extent to which they agreed they could handle each of 5 obstacles to attendance; next, they rated the importance of each in supporting their attendance. The *Intention* scale included 3 items addressing whether individuals intended, would try, and planned to attend 12-step groups. Items inquired about 12-step attendance within the subsequent 12 months. All items used 7-point response scales.

2.3.2 Involvement in 12-step groups—Surveys at all 4 time points also included the AA Affiliation Scale (Humphreys et al., 1998), incorporating questions on number of 12-step meetings attended in the prior 30 days (recoded to 0, .25, .50, .75, or 1.00 based on quartile splits) and 7 yes/no items on 12-step activities/experiences, such as considering oneself a member and reading the literature (recoded to 0 or 1). To these we added 2 items on activities emphasized in MAAEZ, including having a home group and asking for someone's telephone number (also recoded to 0 or 1). To aggregate, we averaged across items (range 0-10, alphas .74-.88). Prior research has demonstrated good reliability and strong predictive power for the AA Affiliation Scale (Humphreys et al., 1998).³

2.3.3 Other measures of treatment readiness—Other measures of treatment readiness were included at baseline for use in validity tests. Specifically, surveys included 3 items on perceived need for treatment from the Alcohol, Drug, and Psychiatric subscales of the Addiction Severity Index (ASI; McLellan et al., 1992). Respondents were asked, “How important to you now is treatment for your alcohol [or drug or psychiatric] problems?” (response scales ranged from 1, Not at all, to 5, Extremely). Higher perceived need has been related to greater use of treatment services and greater positive change in the relevant areas (Shen et al., 2000). Additionally, we included 12 items from a standard motivation to change measure, the University of Rhode Island Change Assessment (URICA, McConaughy et al., 1989; McConaughy et al., 1983). Consistent with Project MATCH, we created a total score by reverse-coding the Precontemplation items (3) and averaging with the Contemplation, Action, and Maintenance items (3 per scale); current alpha=.71. Scores were normalized using a reflect-and-square-root transformation (Tabachnick and Fidell, 1989).

2.3.4 Treatment length of stay—Program billing records were used to determine the number of days each respondent spent in treatment through the 12-month follow-up.

2.3.5 Alcohol and drug use outcomes—Alcohol and drug use were assessed at Times 3 and 4 using items from the Addiction Severity Index (McLellan et al., 1992). Items were combined to create a dichotomous variable reflecting total abstinence for the 30 days prior to the follow-up.

2.3.6 Demographic covariates—Standard demographic information was collected at Time 1, including gender, age, race/ethnicity, marital status, education, employment, and income; responses were categorized for analysis as shown in Table 1.

2.4 Analysis

Initial analyses focused on selecting AAIM items from our preliminary set. We used item-total correlations to evaluate each Intention item. However, since the Attitude, Subjective Norm, and Perceived Control components are not, strictly, scales (evaluating one construct by way

²By mistake, however, participants were asked to rate only the likelihood of being able to help others while they helped themselves (item 1e, Supplementary Materials)—they did not rate the subjective value of this outcome.

³We also examined meeting attendance separately; see Analysis.

of multiple, theoretically correlated items) but rather indices (assessing several conceptually distinct constructs), we did *not* use item-total correlations or factor analysis to select items for these components. Instead, we computed correlations between item scores and the Intention scale, measured simultaneously, since the TPB dictates that items should relate to the targeted behavior via intentions. Analyses were conducted 3 times, using baseline, during-treatment, and 6-month AAIM items. Only those items emerging as significant and powerful predictors of Intention (i.e., with $r's > \pm .15$) across time points were retained. Associations between item scores and lagged 12-step involvement are also reported, but they were not used as the primary basis for item selection. Tests were repeated for the attitudinal, normative, and control beliefs alone and for each of the former when multiplied by its weighting component. Preliminary analyses also involved comparison of different scoring methods for the expectancy-value tests: That is, bipolar scoring (recoded range -3-3) of both the evaluation and belief components, compared to bipolar (-3-3) scoring of the evaluative component and unipolar (1-7) scoring of the belief component; see Ajzen and Fishbein, 2008.

Once we had selected items and optimal scoring, we conducted tests to evaluate the utility of the expectancy-value formulation for AAIM components; that is, to determine whether the weighting factors improved prediction of 12-step attendance. Thus, we calculated 2 types of aggregate indices, one using the raw belief items (i.e., Unweighted Attitude, Subjective Norm, and Perceived Control indices) and the second using the products of belief items and their respective weighting factors (i.e., Weighted Attitude, Subjective Norm, and Perceived Control indices). Each index was computed as the average of its respective items. Note that the TPB dictates use of the Weighted indices. Also note that the Weighted Attitude index was created by multiplying the expectancy rating for “help others while you help yourself” by 2 (on a scale from -3-3), a substitute value since we had no subjective value scores for this item only. Because our aggregate scores were leptokurtic and heavily skewed to the left, we used a reflect-and-logarithm transformation on each (Tabachnick and Fidell, 1989). We then examined whether the Weighted or Unweighted aggregates correlated most strongly with our Intention scale (measured simultaneously) and lagged 12-step involvement at each of the first 3 time points.

Having selected appropriate aggregate indices, we then examined the internal reliability, convergent validity, and discriminant validity of our indices. We examined Cronbach's alpha for each index exploratorily; again, we did not expect items to necessarily cohere. For the validity tests, we computed correlations among TPB components and between TPB components and other measures of treatment readiness.

The last step was to determine whether the AAIM (and TPB) could predict 12-step involvement and, hence, substance use outcomes. Toward this goal, we implemented two path models in MPLUS (Muthén and Muthén, 2007). Key treatment variables including treatment type (long-term residential, short-term residential, or outpatient) and study condition (OFF vs. ON) were entered into preliminary models and dropped where nonsignificant. All analyses incorporating a 12-step participation variable used the full involvement scale, rather than meetings alone, because preliminary analyses indicated that the AAIM was a better predictor of global involvement than meetings per se.

3. Results

3.1 Sample Characteristics

Table 1 displays the sample's characteristics. This table shows a fairly diverse, poor sample. Participants were about one-third women, and 49% identified as Hispanic, Black, or Other. Over one quarter of the sample reported annual household incomes of less than \$10,000. The most prevalent diagnosis was drug-only, and most had had prior treatment.

3.2 Item Analysis

As noted, the initial analyses involved selecting items for the AAIM. All 3 Intention items were highly intercorrelated (see internal reliability, section 3.4) so we retained them all.

Table 2 displays item analyses for the unweighted Attitude, Norm, and Control items included in the final scale. Given the numerous planned analyses, only associations with $p's < .0019$ are indicated as significant (.05/27, the maximum number of tests per component and per outcome, recalling that there were initially 9 Attitude items and 3 time points.) This table shows, across all 3 time points, significant associations between Intention, measured simultaneously, and 5 of the 9 Attitude items, all 4 Norm items, and all 5 Control items. The remaining 4 Attitude items (not shown; see Measures) were not strongly associated with the Intention index ($r's < \pm .15$ across time points) and were poor predictors of 12-step involvement. These 4 items showed similarly weak associations with our criterion variable when multiplied by their weighting factors. Most items were also associated with lagged 12-step involvement. Experimentation revealed that bipolar (-3-3) scoring of value components and unipolar (1-7) scoring of expectancy components generally produced optimal results.

3.3 Expectancy-value Scoring

Additional analyses explored the expectancy-value formulation of the TPB by comparing the performance of the Attitude, Subjective Norm, and Perceived Control components when using raw vs. weighted belief items (not shown). Unexpectedly and contrary to the TPB, we found that the Weighted indices were *less* strongly related with Intention, measured simultaneously, than the Unweighted versions of the same. In fact, the Unweighted versions performed better in all but one case, where the correlations were almost equal. Thus, we used the Unweighted indices in all subsequent analyses.

3.4 Internal Reliability of Components

An additional step in exploring the AAIM was to examine intercorrelations among items (see Table 3). Although we did not expect the Attitude, Subjective Norm, and Perceived Control components to necessarily cohere, analyses suggested quite strong internal reliability for all components, with the exception of the Subjective Norm component at Time 2 (i.e., during treatment).

3.5 Convergent, Discriminant, and Predictive Validity

Table 4, establishing the AAIM's validity, shows associations among AAIM components; between AAIM components, other measures of motivation, and lagged 12-step involvement; and between other measures of motivation and 12-step involvement. There are 5 main points here. 1) The TPB assumes correlations among the Attitude, Norm, Control, and Intention components. The first 3 rows of this table confirm those expectations using Time 1 data. 2) We assumed that treatment length of stay reflects one's attitude, subjective norm, perceived control, and intention regarding treatment, and that because these elements should share variance with the corresponding elements influencing 12-step involvement, treatment length of stay should be associated with all 4 AAIM components. The fourth row confirms these expectations, again using the Time 1 AAIM. 3) We also assumed that the URICA and rated importance of treatment primarily reflect one's attitude toward treatment, and expected that these measures would be associated with the AAIM's Attitude and (hence) Intention components. These expectations are confirmed in rows 5 through 8 (all Time 1). In fact, associations between these motivational variables and most AAIM components proved significant, perhaps because of shared variance with general motivational level. 4) A further (and the primary) assumption of the TPB is that components should be associated with the behavior under question. Accordingly, the final 3 rows show that the AAIM's Attitude,

Subjective Norm, Perceived Control, and Intention components, measured at Time 1, were all associated with 12-step involvement at subsequent time points. (These associations are further explored in our path models, next.) 5) Fifth, one would expect that other indices of motivation should relate to 12-step involvement, although more weakly. Accordingly, the final 3 rows show significant correlations between treatment length of stay, the URICA, and rated importance of treatment and subsequent 12-step involvement—although correlations tend to be weaker and less reliable than they are for the AAIM's components.

3.6 Overall Conceptual Model

Our final test of the AAIM and its underlying theory involved path modeling. We tested 2 lagged models, one predicting Time 3 (6-month) outcomes from the Time 2 (during-treatment) AAIM and one predicting Time 4 (12-month) outcomes from the Time 3 (6-month) AAIM. As Figures 1 and 2 suggest, both analyses supported the scale and theory. All pathways dictated by the TPB were significant, though in both models an additional pathway was added, based on modification indices; that is, a direct pathway between Attitude and 12-step involvement. Model fit was good for both models (see Figure Notes), although the explanatory power of the second was stronger. The models explained 17% of the variance in Time 3 12-step involvement and 41% of the variance in Time 4 involvement.

4. Discussion

4.1 General Summary

A key conclusion of the current research is that the theory of planned behavior (TPB), with qualifications, helps substantially to explain and predict 12-step involvement; likewise for the AAIM. As shown in the path models, one's attitude, subjective norm, and perceived control regarding 12-step involvement, as operationalized by the AAIM, are good predictors of intention to become involved; intention is in turn a good predictor of involvement itself. Despite its brevity, the predictive power of the AAIM was at times substantial. Our scale alone, delivered at Time 3 (6 months), accounted for almost half the variance in 12-step involvement at Time 4 (12 months). Validity tests of the AAIM were also supportive.

These findings suggest that the AAIM should be useful for developing and evaluating 12-step facilitation (TSF) interventions. Existing TSF interventions have not explicitly targeted attitudes, subjective norms, and perceived control regarding 12-step involvement together. Our findings suggest that, because each component makes independent contributions to intention and involvement, interventions should target all three. Further, the AAIM indicates specific factors that TSF interventions might target (see Section 4.2 below for more). The AAIM could also prove useful in daily clinical practice, both as an indicator of drop-out risk and to identify attitudinal, normative, and control factors appropriate for individually-tailored interventions. For example, therapists might intervene with individuals reporting low expectations of social acceptance in 12-step groups by addressing this issue in therapy. Still, because research on the AAIM is preliminary, caution is advised in its application.

A caveat to the conclusions above is that the conceptual model did not function exactly as predicted. One unexpected result was that the Attitude component had a direct impact on 12-step involvement, alongside the indirect effect via Intention. This suggests that individuals do not appropriately account for the anticipated costs and benefits of participation in reporting on their intentions to attend 12-step groups. People's stated intentions regarding 12-step groups may indeed be overly sensitive to social norms (see for example the strong linkages between Norms and Intentions) or other transitory factors, relative to their actual behavior. Consistent with the TPB, Perceived Control also had a direct impact on 12-step involvement unmediated by intention, suggesting again that stated intention does not reflect all of the forces that

ultimately shape behavior. These direct effects mean that measures of intention/general readiness alone are *not* ideal proxy predictors of 12-step involvement. Clients' stated intentions regarding 12-step involvement alone are not reliable predictors of actual involvement; all 3 predisposing TPB factors must be assessed.

Another unexpected result was that weighting the Attitudinal, Normative, and Control beliefs by their perceived value or importance, as dictated by the TPB, did not improve, but detracted from, their predictive power—despite adherence to recommended scoring procedures (Ajzen and Fishbein, 2008). While inconsistent with the TPB, our findings are consistent with another study modeling alcohol and cannabis consumption using the TPB (Armitage et al., 1999), which found that adding expectancy-value interaction terms to models including expectancies and values as main effects did *not* increase predictive power. Similarly negative findings for expectancy-value scoring in other areas have been reported by Rise (1992) and Trafimow and Finlay (2002), among others. The utility of expectancy-value scoring in any given study probably depends on both the behavior in question and item formulation. Where there is large, measurable variation in the values or importance that people assign to outcomes, referents, and control factors, expectancy-value scoring may be productive. Otherwise, the raw belief items may be preferable, as in that case (and perhaps in our case) ratings of value/importance may be useless, or even introduce error.

4.2 Specific Item Analyses

Findings on the relative predictive power of specific AAIM items also merit comment, and may help improve 12-step facilitation efforts during treatment by pointing to targets for change. Almost all of the initial items were reliably associated with the Intention scale and lagged 12-step involvement, so in general all items are good targets for intervention—except the 4 Attitudinal items on potential negative consequences (i.e., having to become religious, having to follow a lot of rules, having to associate with people you don't like, and feeling uncomfortable), regardless of weighting. These questions were probably poorly worded and not unimportant, although there may be other explanations. Still, these factors may be captured somewhat by the AAIM as it stands, since the scale includes items on feeling like you belong and meeting people who can support you in your recovery. One assumes that individuals who anticipated religious pressures, unpleasant rules, bad company, and feeling uncomfortable would score low on those items.

The Attitudinal items showing the strongest associations with 12-step intentions and involvement focused on the social component of 12-step groups: Individuals who felt like they would belong and anticipated being able to help others while they helped themselves were particularly likely to affiliate. These findings highlight the important role of social bonding and helping *others* as mechanisms driving not just the efficacy of 12-steps groups (Bond et al., 2003; Kaskutas et al., 2002), but also affiliation itself (Zemore and Kaskutas, 2008; Zemore et al., 2004). Relatedly, key social influences were friends and other people in recovery; spouses and children had some impact on intentions, but little effect on involvement itself. Dovetailing with these findings, other treatment studies have found that general and alcohol-specific support has more powerful effects when it comes from friends (and AA members especially) than family and coworkers (Beattie and Longabaugh, 1997; Bond et al., 2003). Peer support may be particularly important in 12-step affiliation because peers tend to be models and participants in both substance use and recovery. The Control factors most strongly related to Intention and 12-step involvement were knowing where good meetings are at appropriate times and being able to obtain a sponsor. Both could be good targets for intervention (and were, in the MAAEZ intervention studied here).

4.3 Changes in the Obtained Relationships Over Time

Last, it should be noted that correlations between AAIM items, Intention, and 12-step involvement increased over time. We suspect that associations between AAIM components and 12-step involvement were weak earlier in the study because participants' attitudes, environment, and skills were affected by both treatment and MAAEZ, and in flux: The AAIM and TPB should predict involvement only insofar as no environmental variables intervene on the relevant precursors. This same reasoning probably explains why the model predicting Time 4 outcomes accounted for more variance in 12-step involvement than did the Time 3 model: AAIM components were still in flux between Time 2 (during treatment) and Time 3 (6 months), but less so between Time 3 (6 months) and Time 4 (12 months), since most participants had completed treatment by 6 months. Nevertheless, the strong findings for the second model and the replication of relationships across models support our application of the TPB and scale specifically.

4.5 Limitations

One weakness of the current research is that the AAIM was generated not through systematic interviews but as a side project, in the context of a clinical trial. As a result, we cannot be sure that the AAIM covers all of the important content domains. We are somewhat reassured on this matter because the scale was nevertheless a very strong predictor of 12-step involvement once treatment was over and the environment had stabilized (i.e., in Model 2). However, improvements to the scale are conceivable.

Another limitation is that the AAIM was a weaker predictor of meeting attendance than global involvement (including meetings and activities). This seems odd because wording of the AAIM targets meetings specifically. We think that AAIM components predicted activities best because: 1) meeting attendance was often strongly encouraged by treatment programs, whereas participation in activities was volitional, and 2) the 30-day time frame surrounding meeting attendance was too short to accurately represent attendance in the entire window between the AAIM's assessment and follow-up. Though surprising, the AAIM's superior predictive power for global involvement is not damning, since studies suggest that involvement in 12-step-related activities is not less but perhaps more important than meeting attendance per se in producing good substance use outcomes (Kaskutas et al., 2004; Montgomery et al., 1995; Weiss et al., 2005; Weiss et al., 1996).

Finally, our scale was validated on a single treatment population, and hence, generalizability to other populations and subgroups remains unclear. Relatedly, it will be important to establish whether the scale works as well among those coerced into treatment vs. those entering volitionally. (We did not have measures of coercion in the current study, though some coerced clients were included.) Future work will consider these questions, and will test how demographic variables, clinical variables, and MAAEZ participation impacted individuals' 12-step-related attitudes, norms, and perceived control over time.

Supplementary Material

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References

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Figure 1. AAIM components: Prediction of Time 3 outcomes (Model 1)

Notes. $\chi^2(15, 322)=19.03$, $p=.21$, CFI=0.97, TLI=0.94, RMSEA=.028. Model controls for effect of treatment type (long-term residential, short-term residential, or outpatient) on 12-step involvement.

Figure 2. AAIM components: Prediction of Time 4 outcomes (Model 2)

Note. $\chi^2(5, 322)=8.03$, $p=.15$, CFI=0.98, TLI=0.93, RMSEA=.043.

Table 1

Sample characteristics.

Variable	Parameter
Gender: male	67%
Race	
White	52%
Hispanic	22%
Black	20%
Other	7%
Education: any college/technical school	46%
Employment status: part/full-time	37%
Annual household income	
<\$10,000	26%
\$10-\$49,999	42%
>\$50,000	32%
Marital status: % married/living with partner	28%
Diagnosis	
Alcohol dependence only	17%
Drug dependence only	43%
Alcohol and drug dependence	23%
No dependence diagnosis	18%
Prior treatments	
None	34%
1-2	38%
3+	28%
Mean (range) age in years	36 (18-65)

Table 2

Correlations (r 's) between AAIM items, Intention to attend 12-step groups, and the 12-step involvement scale (TS invmt.).

I. ATTITUDE COMPONENT: "If you attend 12-step groups during the next 12 months, how likely is it that you will..."						
	Item at Time 1	Item at Time 2	Item at Time 3	Average r		
	Intent to attend, Time 1	Intent to attend, Time 2	Intent to attend, Time 3	TS invmt., Time 4	Intent to attend, Time 4	Lagged TS invmt.
1. "be able to avoid drinking and using drugs"	.26***	.35***	.45***	.44***	.35	.24
2. "feel like you belong"	.33***	.39***	.48***	.45***	.40	.32
3. "meet people who can support you in your recovery"	.25***	.49***	.42***	.38***	.39	.29
4. "learn what to do when you want to drink & do drugs"	.23***	.35***	.36***	.37***	.31	.28
5. "help others while you help yourself"	.25***	.30***	.34***	.36***	.30	.30
Average r						
Lagged TS invmt.						
III. NORM COMPONENT: "Let's think now about the people in your life. How positively do the following people feel about your attending 12-step groups in the next 12 months?"						
	Item at Time 1	Item at Time 2	Item at Time 3	Average r		
	Intent to attend, Time 1	Intent to attend, Time 2	Intent to attend, Time 3	TS invmt., Time 4	Intent to attend, Time 4	Lagged TS invmt.
1. "your group of friends"	.26***	.32***	.50***	.44***	.37	.27
2. "your partner/spouse"	.28***	.41***	.41***	.23***	.37	.16
3. "your children"	.34***	.27***	.48***	.39***	.36	.18
4. "other people you know in recovery"	.35***	.38***	.40***	.30***	.38	.21
Average r						
Lagged TS invmt.						
III. CONTROL COMPONENT: "Assuming you wanted to attend 12-step groups during the next 12 months, how much do you agree that you would..."						
	Item at Time 1	Item at Time 2	Item at Time 3	Average r		
	Intent to attend, Time 1	Intent to attend, Time 2	Intent to attend, Time 3	TS invmt., Time 4	Intent to attend, Time 4	Lagged TS invmt.
1. "know where good mtgs. are when you need them"	.25***	.35***	.45***	.38***	.35	.31
2. "know how to act at meetings"	.22***	.37***	.32***	.20***	.30	.19
3. "know how to meet clean and sober friends"	.25***	.23***	.29***	.33***	.26	.25
4. "know how to choose a sponsor"	.22***	.20***	.35***	.45***	.26	.33
5. "be able to ask someone to be your sponsor"	.25***	.30***	.40***	.40***	.32	.34
Average r						
Lagged TS invmt.						

Table 3

Reliability of AAIM components.

Subscale	Time 1 α	Time 2 α	Time 3 α	Time 4 α
Attitude	.75	.79	.83	.82
Norm	.76	.56	.81	.80
Control	.83	.78	.83	.85
Intention	.80	.86	.91	.95

Table 4

Correlations (r's) between AAIM components and selected measures (all at Time 1, unless noted)[/].

	Attitude	Norm	Control	Intent	Tx. length of stay	URICA score	Subj. import. alc. tx.	Subj. import. drug tx.	Subj. import. psych. tx.	TS invmt., T2	TS invmt., T3
Norm	.41***	1.00									
Control	.58***	.37***	1.00								
Intention	.37***	.33***	.30***	1.00							
Treatment length of stay	.13***	.15***	.15***	.08 [†]	1.00						
URICA score	.29***	.25***	.23***	.37***	.02	1.00					
Subj. importance of alcohol tx.	.25***	.13*	.20	.27***	.00	.29**	1.00				
Subj. importance of drug tx.	.22***	.16**	.14	.18***	.16**	.18**	.15*	1.00			
Subj. importance of psych. tx.	.18***	.20***	.07	.17***	-.01	.29***	.21**	.07	1.00		
Twelve-step involvement, T2	.27***	.20***	.34***	.28***	.12 [†]	.25***	.13 [†]	[.09]	[.11]	1.00	
Twelve-step involvement, T3	.23***	.12*	.27***	.31***	.16***	.17***	.21***	[.09]	[.14 [†]]	.60***	1.00
Twelve-step involvement, T4	.27***	.15	.27	.30	.20***	.19***	.21*	[.14*]	[.09]	.45***	.72***

[/] Convergent/discriminant validity tests of AAIM components in **bold**; predictive validity of AAIM components in underlined **bold**; predictive validity of other motivational measures in bracketed **bold**.

*** p<.001,

** p<.01,

* p<.05,

[†] p<.10.