



Predictors of utilization of an IVR self-monitoring program by problem drinkers with recent natural resolutions

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ABSTRACT

Background: As part of a randomized controlled trial, problem drinkers who recently initiated natural recovery on their own were offered access to an interactive voice response (IVR) self-monitoring (SM) system as a sobriety maintenance tool during early recovery when relapse risk is high. Because observed IVR utilization was variable, predictors of utilization were evaluated to inform knowledge of populations likely to access and use IVR services.

Methods: Participants were 87 untreated community-dwelling adults who recently initiated sobriety following longstanding high-risk drinking practices and alcohol-related problems ($M = 16.58$ years, $SD = 10.95$). Baseline interviews assessed pre-resolution drinking practices and problems, and behavioral economic (BE) measures of reward preferences (delay discounting, pre-resolution monetary allocation). Participants had IVR access for 24 weeks to report daily drinking and to hear weekly recovery-focused messages.

Results: IVR use ranged from 0 to 100%. Frequent ($n = 28$), infrequent ($n = 42$), and non-caller ($n = 17$) groups were identified. Non-callers tended to be younger and to report heavier pre-resolution drinking. Frequent callers ($\geq 70\%$ of IVR days) tended to be older, male non-smokers with higher/stable socio-economic status and lower delay discounting compared to infrequent callers. Premature drop-out typically occurred fairly abruptly and was related to extended binge drinking.

Conclusions: Characteristics common in the untreated problem drinker population were associated with higher IVR utilization. This large under-served population segment can be targeted for lower intensity alcohol interventions using an IVR platform.

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1. Background

Most problem drinkers do not seek professional alcohol treatment (Klingemann and Sobell, 2007). The minority who do tend to have more severe problems and to seek help late in problem development when health and daily functioning have been impaired (Simpson and Tucker, 2002; Sobell et al., 1996). Lower threshold interventions not requiring health care system entry are needed to expand services for drinkers who find formal treatment and mutual help groups such as alcoholics anonymous (AA) unappealing (Tucker and Simpson, 2011).

Interactive voice response (IVR) systems are a computerized telecommunications platform that can extend the reach of care from the clinic into the community (Abu-Hasaballah et al., 2007;

Tucker and Grimley, 2011). They allow callers to report quickly and privately on health behaviors, including alcohol use (e.g., Helzer et al., 2008) and related contextual variables (e.g., Ayer et al., 2011), and can be made available over long intervals for cost-effective risk monitoring, relapse prevention, and rapid treatment re-entry when needed (Tucker and Simpson, 2011). Although generally well accepted, IVR systems are not universally appealing, and utilization varies (e.g., Helzer et al., 2008; Mundt et al., 2006). Furthermore, most studies have evaluated IVR applications delivered in conjunction with professional alcohol treatment (e.g., for post-treatment relapse prevention), but not as a stand-alone aid to natural resolution. In either case, understanding which segments of drinkers find IVR systems appealing is essential to realizing their potential as stand-alone interventions for otherwise untreated high-risk drinkers or as clinical treatment add-ons.

Data analyzed in the present study are from an evaluation of IVR self-monitoring (SM) as a tool for stabilizing natural recoveries (Tucker et al., in press). IVR SM had beneficial effects on drinking outcomes for selected subgroups of the non-treatment-seeking sample, but only if it was used. The present study investigated

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predictors of observed IVR utilization among problem drinkers who had recently initiated sobriety on their own, either abstinence or low-risk drinking without problems, following longstanding high-risk drinking practices and alcohol-related problems. IVR access was presented as a low-intensity recovery support option that did not require entering formal alcohol treatment, which is unappealing to many persons with alcohol-related problems. Shortly after initiating sobriety, when relapse risk was high, participants received 24 weeks of IVR access to report daily drinking and contextual variables and to hear recovery-support messages. Prior to IVR access, baseline interviews assessed established drinking outcome predictors including demographics, pre-resolution drinking practices and problems, and behavioral economic (BE) measures of impulsive choice and preference for short-term rewards such as drinking (i.e., delay discounting, pre-resolution discretionary spending on alcohol versus saving for the future; Tucker et al., 2009).

Three sets of hypotheses were evaluated using data from participants randomized to the IVR intervention condition. First, consistent with past research, IVR utilization was predicted to vary across participants, with greater utilization associated with older age and higher or more stable socio-economic status (SES; e.g., Horvath et al., 2007). Second, BE measures of impulsive choice shown to predict addictive behavior change (e.g., Bickel and Marsch, 2001; Tucker et al., 2009) were investigated in relation to IVR utilization. Persons with addictive disorders tend to make choices that favor shorter- over longer-term rewards and to organize present behavior accordingly. Consistent engagement in IVR SM was hypothesized to be associated with less impulsive baseline behavior patterns, i.e., lower discounting of delayed rewards and relatively greater pre-resolution year monetary allocation to saving for the future than purchasing alcohol. Third, premature IVR drop-out was hypothesized to vary with drinking practices reported earlier during the SM interval. Conventional wisdom suggested that IVR dropout would be preceded by relapse, particularly extended binge drinking. An alternative possibility was that IVR dropout would be preceded by stable abstinence making continued SM less useful for behavioral regulation.

2. Methods

2.1. Sample characteristics

The sample consisted of the subset of 87 participants in the larger trial who were randomized to the IVR SM intervention designed to support initial recovery without formal alcohol treatment from a qualified provider or program (e.g., professional counseling, physician supervised pharmacotherapy, residential/outpatient treatment) or extensive participation in AA or other mutual help groups (Tucker et al., *in press*). The assessment-only control group did not provide IVR data and were excluded from the present analyses. The research received Institutional Review Board approval and a federal Certificate of Confidentiality.

Advertisements recruited adults in Alabama, Georgia, and Mississippi, who were screened using the Michigan Alcoholism Screening Test (MAST; Selzer, 1971), Alcohol Dependence Scale (ADS; Skinner and Horn, 1984), and Drinking Problems Scale (DPS; Cahalan, 1970). Eligibility criteria were: (1) legal drinking age (≥ 21 years), (2) high-risk drinking practices and alcohol-related problems ≥ 2 years, (3) no current other drug misuse (except nicotine) based on participants' reports of current use of other drugs at initial assessment, and (4) problem drinking cessation in the past 3–16 weeks without alcohol-focused interventions ($M = 2.30$ months resolved, $SD = 0.99$). Resolution onset was defined as the most recent date participants began abstaining or drinking in a non-problem manner without further high-risk drinking (Sobell et al., 1996). Non-problem drinking was defined as (a) no dependence symptoms on the ADS; (b) no alcohol-related negative consequences on the DPS; and (c) no risky drinking days (≥ 5 standard drinks/day for men, ≥ 4 drinks/day for women; National Institute on Alcohol Abuse and Alcoholism, 2005). Problem drinking was defined as drinking that exceeded these limitations on any screening criterion. Limited earlier help-seeking was not an exclusion criterion if it occurred ≥ 2 years before the current resolution and was limited to medication, religious/pastoral counseling, or lifetime attendance of ≤ 9 AA meetings.

Table 1 presents the sample baseline characteristics as a function of subsequent IVR utilization patterns. Problem histories were consistent with moderate alcohol dependence typical of outpatient treatment samples (Miller and Munoz, 2005).

Although not required, participants met diagnostic criteria for alcohol dependence (American Psychiatric Association, 1994).

2.2. Procedures

Procedures summarized here are similar to those detailed in earlier publications (e.g., Tucker et al., 2007, 2009, *in press*), including selection of validated measures and establishment of interview reliability and validity. All procedures described here are specific to the current study; selected procedures relevant only to the parent study are published elsewhere (Tucker et al., *in press*). In baseline sessions, participants were consented, with sobriety verified by breathalyzer. Drinking practices and monetary allocation during the pre-resolution year were assessed using an expanded timeline followback (TLFB) interview (Sobell and Sobell, 1992; Vuchinich and Tucker, 1996). Participants were administered a computerized delay discounting task (Rachlin et al., 1991), received IVR training, and given IVR access for 24 weeks. Compensation was via university-issued gift cards or checks (\$50 per interview).

2.2.1. Drinking practices and money spent on alcohol. Participants reported past year consumption of beer, wine, or liquor consumed (in oz.), converted to ml of 190-proof ethanol for analysis. They also reported daily spending on alcohol, regardless of whether the alcohol was consumed.

2.2.2. Monetary allocation. Participants reported income and expenditures for the same period using U.S. federal consumer expenditure commodity classes (Vuchinich and Tucker, 1996). Income in dollars was reported by source (e.g., wages, loans). Expenditures were reported in three general categories, each with subcategories, including housing (e.g., mortgage, utilities), consumable goods (e.g., food, alcohol), and other (e.g., entertainment, voluntary savings). Transactions were summed to obtain category totals for analysis.

Pre-resolution year expenditures were separated into obligatory and discretionary categories (Tucker et al., 2009). Obligatory expenditures were for essential, largely fixed costs of living (e.g., housing, transportation). Discretionary expenditures were for less essential, intermittently purchased commodities (e.g., recreation, alcohol, elective savings). An Alcohol-Savings Discretionary Expenditure (ASDE) index was computed for analysis as the proportion of pre-resolution discretionary expenditures spent on alcohol minus the proportion put voluntarily into savings. ASDE values ranged from 1.0 to -1.0 ; higher scores indicated proportionally more money spent on alcohol and less toward savings.

2.2.3. Delay discounting task. Participants repeatedly chose between hypothetical monetary rewards of smaller amounts now versus a larger amount later (e.g., "\$500 now or \$1000 in 6 months?") across a series of delays (Rachlin et al., 1991). A titration procedure determined an equivalence point at each delay, at which the values of the larger later and the smaller immediate amounts were rated as equally preferred. Equivalence points were fit to Mazur's (1987) discounting equation to determine a discount rate (k -parameter) for each participant: $v = A_i / (1 + kD_i)$, with v , A_i and D_i representing the equivalent present value (e.g., \$500), the fixed delayed amount (e.g., \$1000), and delay in weeks to the reward, respectively. The k -parameter is an individual difference variable, generally ranging from 0 to 1, that is proportional to rate of reward discounting. Higher k -parameters indicate higher discounting and stronger preference for more immediate rewards. Because k -parameters tend to cluster at the lower end of the possible range, analyses used the natural logarithm of k .

2.2.4. IVR intervention. Detailed description is available in Tucker et al. (*in press*). After training, participants accessed the toll-free IVR system, programmed using commercial software (SmartQ-Version 5 (5.0.141), Telesage, Chapel Hill, NC). Daily questions assessed ounces of beer, wine, and liquor consumed; use of other drugs to "get high;" and dollars spent on alcohol and other drugs during the 24-h period midnight-to-midnight yesterday. Questions about other activities on the preceding day balanced call duration when no substance use was reported.

Additional questions asked once a week varied day-to-day on Monday through Thursday (e.g., strategies used to avoid/limit drinking, activities paired with drinking). On Mondays, participants received verbal feedback concerning last week's drinking goals and set goals for the coming week. On Fridays, they could listen to 1–2 min IVR-delivered education modules patterned after guided self-change materials (e.g., goal-setting, relapse prevention) (Sobell and Sobell, 1993). Daily and weekly surveys averaged 4.6 and 2.3 min, respectively.

Points for daily calls were awarded and modestly reimbursed via an "electronic bank" (Searles et al., 1995), a commonly used procedure to encourage daily calls. Participants received \$0.50 minimum for each daily call and \$1.00 after 7 consecutive calls; bonus payments stopped when a call was missed, were reinstated after another 7 consecutive calls, and so forth. Among those who called at least once, mean earnings were \$33.79 ($SD = 52.56$).

2.2.5. Data quality checks. Participant reports of help-seeking, resolution status, and drinking practices were verified using brief collateral phone interviews scheduled after participants' initial interview and annually thereafter; 82% of participants nominated collaterals, and one or more collateral interviews were completed for 43% of

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