Short communication Correspondence between Interactive Voice Response (IVR) and Timeline Followback (TLFB) reports of drinking behavior

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Abstract

This study compared reports of alcohol consumption using an Interactive Voice Response (IVR) system and the Timeline Followback (TLFB). One hundred eighty-two daily smokers who were not alcohol dependent provided once daily reports of alcohol consumption using an IVR system and participated in a weekly TLFB interview. The reporting time period was 7 days after participants attempted to quit smoking as part of participation in a smoking cessation clinical trial. The results revealed moderate to high correlations between reports of drinking behavior as assessed by IVR and TLFB. Reporting biases for both IVR and TLFB were approximately equal, with a slight trend toward underreporting drinking on the TLFB. Compliance with the IVR system was poor. This study provides preliminary evidence that it is possible to use an IVR system for the assessment of alcohol use in smokers participating in a clinical trial, and IVR seems to adequately assess drinking behavior in those that use the system. However, future studies should focus on improving compliance with IVR in this population.

Keywords

Interactive Voice Response; Timeline Followback; Alcohol; Tobacco; Drinking; Smoking

1. Introduction

A number of methods have been devised for monitoring drinking. The most common measure is the Timeline Followback (TLFB; Sobell & Sobell, 2003), which is a retrospective assessment of drinking behavior. More recently there has been interest in using advanced technology to measure self-reported alcohol use. For example, Interactive Voice Response (IVR) technology, in which participants use their touch-tone telephone to provide reports of drinking, was found to correlate highly with self-reports of alcohol consumption, collateral reports, and blood alcohol concentration tests (Perrine, Mundt, Searles, & Lester, 1995).

The alcohol TLFB (Sobell & Sobell, 2003) provides an assessment of a client's drinking history for time windows up to the past 360 days by having participants provide retrospective reports of their drinking behavior. Numerous studies have shown satisfactory reliability and validity for this instrument [see Sobell and Sobell (2003) for a review], and several studies have compared the TLFB to IVR assessments of drinking behavior. These studies have generally

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shown adequate correspondence between these two assessment tools (Bardone, Krahn, Goodman, & Searles, 2000; Searles, Helzer, & Walter, 2000) using community-based and college student samples. One detailed analysis showed that the TLFB consistently underestimated alcohol consumption as compared to IVR (Searles, Helzer, Rose, & Badger, 2002). Thus, all of the previous studies comparing TLFB and IVR have focused on assessing drinking behavior in community-based and college student populations. No studies to date have compared IVR to TLFB reports of drinking in cigarette smokers enrolled in a smoking cessation clinic. Such a study is warranted, as alcohol and tobacco use often co-occur (Shiffman & Balabanis, 1996). Many adult cigarette smokers are alcohol dependent (Hughes, 1999). In addition, smokers are approximately 1.3 times more likely to drink than nonsmokers, and about 85% of smokers drink alcohol (Shiffman & Balabanis, 1996).

In the present study, IVR reports of drinking behavior were compared to TLFB reports of such behavior in a relatively large sample of smokers participating in a smoking cessation clinical trial. Analyses comparing IVR and TLFB reports of smoking behavior from this data set are reported in Toll, Cooney, McKee, and O'Malley (in press).

2. Method

2.1. Participants and procedure

The present study is a secondary analysis of data from a sample of 385 smokers who participated in a double-blind, placebo-controlled clinical trial analyzing whether naltrexone augments the effects of the transdermal nicotine patch for smoking cessation (O'Malley, 2004). The present analyses are based on the subset of participants that reported alcohol consumption (n =182) on at least one day on either the IVR system or by TLFB during the first week of their participation in the original clinical trial. Participants (59.3% male) had an average age of 46.08 (SD=11.21). Of these 182 drinkers, 52.5% were married; 89% were Caucasian; and 78.2% were employed full time. Based on a 30-day TLFB baseline assessment of drinking, participants in this sample drank 2.33 (SD=2.36) days per week on average, consuming a mean of 5.66 (SD=6.45) drinks per week.

Consistent with procedures outlined by Sobell and Sobell (1992, 1995, 2003), baseline TLFB data was gathered for 30 days prior to participants' first screening session of the clinical trial, and at all weekly appointments individuals were verbally asked to indicate the number of standard alcoholic beverages (i.e., 12 oz. beer, 5 oz. wine, or 1.5 oz. liquor) they consumed each day for the preceding week. The present study is based on data gathered the first week after participants' smoking quit date. Participants were instructed to call the IVR telephone line first thing in the morning for 7 days in a row, beginning the day after their quit date. Participants called a dedicated toll-free number that was active throughout the United States, which was connected to a computerized system that collected daily reports for each of the 7 days. Participants reported the number of standard alcoholic beverages (i.e., 12 oz. beer, 5 oz. wine, or 1.5 oz. liquor) they consumed in the past 24 h by touching numbers on their telephone keypad. To increase compliance with daily IVR reports, participants earned $2 for each day the telephone questionnaire was completed. Participants were not paid specifically to provide the TLFB data included in the present analyses, but they were paid up to $100 for completing the intake, termination, and follow up interviews for the smoking cessation trial. This study was approved by the Human Investigation Committee of the Yale University School of Medicine.

3. Results

3.1. IVR response rate and TLFB data collection

It was requested that the 182 participants report their drinking behavior using the IVR system over a 7 day time period for a total of 1274 possible reports. Actually, 83.1% of these reports were given. Complete data (i.e., reporting every day over the entire 7 day interval) was obtained for 46.2% of the sample. It should be noted that the number of daily reports either stayed the same or progressively declined each successive day, with a slightly larger decline on the seventh day. The percentage of complete data (i.e., reporting every day) for each of the seven days, beginning with day one, was: 91.8%, 83.5%, 75.8%, 67.6%, 62.6%, 56.6%, and 46.2%. This somewhat larger decline on the seventh day might be related to the structure of the clinical trial. Specifically, participants were seen for their second treatment session on their sixth day of calling the IVR system, and many of them may have forgotten that they were supposed to call on the day after this session.

As with the IVR system, there was an attempt to collect 1274 possible reports (i.e., 182 participants reporting over 7 days) using TLFB. From these, a total of 97.3% of reports were obtained. Complete data (i.e., reporting over the entire 7 day interval) was obtained for 94.0% of the sample.

3.2. Drinking data

Correlations between IVR and TLFB for each of the 7 assessment days and an aggregate total (i.e., the sum of the values reported for days 1 through 7) for drinking behavior are presented in Table 1. All correlations for the drinking values are significant and fall within the moderate to high range, and the sample size decreased on almost every day that behavior was reported.

Results were also analyzed using the GENMOD procedure by SAS 8.0 for Windows (SAS Institute, Inc., 1999). Generalized Estimating Equations (GEE) models with Poisson distribution were chosen to fit the data, and no effects of method or method × time were found (i.e., there was not a significant difference between the two types of assessment and there was not an interaction for assessment × time).

An analysis of concordance between TLFB and IVR was made for the 182 participants that reported drinking on at least 1 day during the 7-day time interval. One thousand thirty-nine reports were made by both TLFB and IVR out of the 1274 total requested reports. Of these 1039 reports, there were 84 instances (i.e., 8.1%) where the TLFB value was equal to zero and the IVR values were greater than zero, and the range of these values was from 1 to 12, with a mean of 2.82 (SD= 2.26).[1] There were 41 instances (i.e., 3.9%) in which the IVR value was equal to zero and the TLFB value was greater than zero, and the range for these values was from 1 to 10, with a mean of 2.56 (SD= 1.87).

4. Discussion

Using data provided by cigarette smokers participating in a smoking cessation clinical trial, comparisons were made between daily alcohol consumption as measured by an IVR system and the TLFB. Consistent with previously published studies (Bardone et al., 2000; Perrine et al., 1995; Searles et al., 2000), mostly moderate correlations between IVR and TLFB were found for day-by-day measurement of drinking behavior, and there was considerable variation in the daily correlations. However, no differences were found using a GENMOD procedure,

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[1]Based on the data in the IVR database combined with values for the participants' TLFB data for the duration of the clinical trial, it appeared that two participants entered two values in error to the IVR system. These two values, one value of 24 drinks on one day and one value of 50 drinks on one day, were consequently excluded.

suggesting no difference in average alcohol consumption measurement as assessed by these two types of reporting tools. Thus, some of the variation in the correlations between the two assessment instruments may be due to participants misremembering the day on which alcohol use occurred. In fact, the correlation between the aggregate measure of number of drinks consumed over the 7 days was relatively high ($r = .87$). The reporting biases were approximately equal, but there was a slight trend for the TLFB to underestimate reports of drinking as compared to IVR, which is consistent with previous research (Searles et al., 2002).

Compliance with the IVR system was poor as compared to TLFB. Complete data (i.e., reporting every day over the 7 day time interval) was obtained for 46.2% of the sample for IVR, as compared to 94.0% of the sample for TLFB. This may be related to the relatively low incentives that participants received for providing IVR data. In other studies of drinking behavior that found much better compliance, larger incentives as well as reminder phone calls were used (Bardone et al., 2000; Searles et al., 2000). It is important to note, however, that smoking cessation clinical trials often utilize a relatively large sample of participants, which may make it prohibitive to provide large incentives.

There are several limitations to the present study. First, the TLFB procedure used in this study asked participants to recall 1 week of drinking, and longer periods of retrospective recall may yield different results. Second, using the IVR reporting system may have led to more accurate TLFB reports. Third, compliance may have been different if participants were required to report to the IVR system throughout the study treatment instead of for only 1 week. Fourth, the higher correlation found with the aggregate data (i.e., the sum of days 1 through 7) might be the result of a selection bias related to the subset of participants that provided reports on all days ($n = 80$). Last, since this study focused on smokers participating in a smoking cessation clinical trial for a short time span (i.e., 1 week), the generalizability of the findings are somewhat restricted. Nonetheless, future smoking cessation trials may be interested in methods for monitoring alcohol consumption given that heavy drinking is prevalent among smokers (Shiffman & Balabanis, 1996) and could be modified by the treatments under study.

In conclusion, the findings of this study show that it is possible to use IVR technology to measure drinking behavior with smokers participating in a smoking cessation clinical trial, and for those individuals that use the system, it appears to adequately assess alcohol consumption. However, one important issue that should be addressed before IVR can be used with this population is whether or not compliance with this technology can be improved.

Acknowledgements

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Table 1

Correlations between IVR and TLFB reports of the number of drinks consumed for each assessment day and an aggregate total

	n	r
Day 1	163	.67
Day 2	160	.72
Day 3	157	.79
Day 4	153	.63
Day 5	153	.74
Day 6	139	.56
Day 7	114	.67
Total	80	.87

Note. All correlations were significant ($p < .05$). For Days 1 through 7, the *n* reflects the number of participants who provided reports by both IVR and TLFB. For the Total, the *n* represents the number of participants who provided complete data for the entire week, and the *r* is the correlation between IVR and TLFB for the sum of the values for Days 1 through 7.