



Short communication

## Comparing electronic-keypad responses to paper-and-pencil questionnaires in group assessments of alcohol consumption and related attitudes

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### Abstract

Electronic versions of questionnaires have the potential to improve research and interventions in the addictions. Administering questionnaires electronically to groups, however, has proven difficult without a multitude of computers, but gathering data electronically from a group could make for easy assessment and quick feedback. Using a sample of 107 college students, we examined the validity of wireless keypad survey responses by comparing them to traditional paper-and-pencil questionnaires. The two formats led to almost identical responses that did not differ significantly from each other (all effect sizes less than  $g=.15$ ) and high correlations between formats. The wireless, handheld keypad procedure appears to generate data that are as valid as questionnaire responses and permit rapid feedback to groups, as well as easy, human error-free data entry for analysis.

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### 1. Introduction

Researchers view paper-based self-reports of alcohol consumption as valid, but continue to debate the relative merits of other approaches to assessment (Del Boca & Darkes, 2003). Computer-based assessments, where participants enter their own data, have grown increasingly popular (Del Boca & Darkes, 2003; Miller et al., 2002). Sobell, Brown, Leo, and Sobell (1996) identified several advantages

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of computer-based forms of assessment, including easy storage and retrieval of information, the provision of standardized instructions to all respondents, and a nonjudgmental and non-threatening format for self-report. Additionally, respondent feedback has identified that computer assessment methods make assessment quicker and easier to complete, foster greater enjoyment of the assessment process than traditional methods, and increase the credibility of subsequent interventions (Martin, 1995).

The majority of research on self-report methods of assessment focuses on participants who respond individually. Even self-reports administered to groups typically remain individual level assessments with little alteration to their content or format. In general, a paucity of research evaluating the adaptation of individual level assessments for group administration exists (i.e., LaBrie, Pedersen, & Earleywine, 2005). An alternative approach to collecting individual level information in a group setting is to broadcast questions using PowerPoint software to a group of participants using wireless handheld keypads. Unlike typical computer-based assessments, participants do not have a private screen for questions and responses. Participants read the questions and response choices in a group setting and respond via wireless handheld keypad devices. Even with respondents in a group setting, wireless handheld keypad devices can be used privately and confidentially, with no communication of answers between participants. To our knowledge, no studies have examined the validity of assessing alcohol use with wireless handheld keypads in an interactive group setting.

The current pilot study compares wireless handheld keypad devices with the use of traditional paper-based assessment methods in a group of college students. We hypothesized that wireless handheld keypads would provide equivalent data to paper-based self-report questionnaires, thereby supporting the concurrent validity of the wireless handheld keypad technology.

## **2. Method**

### *2.1. Participants*

College students ( $N=107$ ) recruited from four undergraduate courses completed the group-administered wireless keypad and paper-based survey assessments of drinking behavior and perceptions of campus drinking norms in a single session. The coed sample was comprised of 42 males (40%) and 65 females (60%). They averaged 19.09 (S.D.=1.19) years of age.

### *2.2. Procedure*

In four class settings, participants signed local IRB-approved consent forms and received assurances that their responses were confidential. Upon consenting, each participant completed an anonymous 10-min paper-based survey. Later in the same session, each participant completed an identical survey using a wireless handheld keypad device as questions were presented, one at a time, on a large screen to the entire group. A facilitator read the instructions and each question aloud. The facilitator waited until every participant responded or at least 1 min before presenting the next item.

A brief alcohol assessment instrument was developed to assess participant drinking behavior and perception of campus drinking norms. Participants first responded to several demographic questions. Next, they completed several questions assessing alcohol use. Modifications of the Drinking Norms Rating Form (DNRF; Baer, Stacy, & Larimer, 1991) and the Quantity Frequency measure (QF; Dimeff,

Baer, Kvilahan, & Marlatt, 1999) assessed how often one drank alcohol, how much they typically drank at one time, how much they drank on the occasion in which they consumed the most, and how many times in the last 2 weeks they drank five or more alcoholic drinks in a 2-h period. They also responded to the same behavioral questions regarding perceptions of the drinking behavior for both a “typical student on your campus” and “a typical student of your gender.” Each item had a series of forced choice responses. Finally, they answered questions from The Social Norms Surveys Online (Perkins & Craig, 2004) that assessed the individual attitudes towards drinking, as well as the individual perceptions of the attitudes towards drinking held by typical students of their gender. A five-point Likert scale ranged from “drinking is never a good thing” to “a frequent ‘drunk’ is okay if that’s what the individual wants.”

Option Technologies, LLC designed the wireless handheld keypad devices and software. The OptionFinder System is an interactive keypad-based software system comprised of handheld wireless keypads, a PowerPoint-based software, and a base station that sends and receives signals between the keypads and computer. Administrators create a set of questions, place each question on a separate PowerPoint slide, and reveal slides to the audience one at a time. Each slide also contains a set of forced choice response formats (i.e., yes/no, multiple choice, Likert-scale). The participants press the keypad number of the response that matches their answer. Each keypad can only enter one response for each question, although responses can be changed until the slide advances. As the participants respond, the OptionFinder software takes the keypad responses and instantly saves the latest individual responses in a data spreadsheet, calculates group statistics, and, if desired, produces graphical feedback. A running count of responses on the bottom of the slide allows the facilitator to determine when to proceed. The benefit of the system is that it standardizes the entire group process, aiding in reliability across multiple uses of the same survey design while keeping the privacy and anonymity of individual responses.

### 3. Results

A series of within-subjects *t*-tests was conducted to determine differences between assessment formats. The results revealed no significant differences between item responses on any of the assessed variables from the two different assessment styles. Table 1 contains means and standard deviations for each item by assessment format, as well as the effect size of each difference.

Table 1  
Descriptive statistics demographic, normative, and drinking variables

Variable	Keypad format		Paper-based format		Effect size
	<i>M</i>	(S.D.)	<i>M</i>	(S.D.)	<i>g</i>
Age (years)	19.09	(1.19)	19.08	(1.18)	.01
Injunctive–self	2.78	(.81)	2.74	(.76)	.01
Injunctive norm–other	3.44	(.83)	3.52	(.84)	–.10
Consumption–self	3.38 (2–3/month)	(1.67)	3.62 (2–3/month)	(1.72)	–.14
Consumption–other	5.07 (1–2 /week)	(1.00)	5.05 (1–2 /week)	(.85)	.02
Average–self	3.43 (3–4 drinks)	(1.61)	3.25 (3–4 drinks)	(1.49)	.12
Average–other	3.60 (3–4 drinks)	(2.00)	3.35 (3–4 drinks)	(1.88)	.13
Heavy–self	2.23 (4–6 drinks)	(1.36)	1.96 (4–6 drinks)	(1.25)	.03
Heavy–other	3.36 (7–9 drinks)	(1.06)	3.23 (7–9 drinks)	(1.03)	.12

Normative and drinking variables were rated on 5-point Likert scales.

Table 2  
Correlation matrix for OptionFinder and paper-based assessment variables

Variable	1	2	3	4	5	6	7	8
1 Injunctive–self		.01	.58*	.04	.55*	.44*	.46*	.02
2 Injunctive–other	.04		–.19**	.13	–.24**	–.15	–.25***	–.04
3 Consume–self	.65*	–.08		.16	.71*	.77*	.72*	.08
4 Consume–other	–.07	.10	–.16		.06	.07	.17	.45*
5 Average–self	.48*	–.20***	.69*	.16		.79*	.66*	.17
6 Maximum–self	.50*	–.12	.81*	–.03	.77*		.72*	.08
7 Binge–self	.50*	–.12	.67*	–.10	.67*	.72*		.29***
8 Binge–other	.10	.24**	–.05	.29***	.02	.04	.15	

Upper half correlations for paper-based individual assessment. Lower half correlations for OptionFinder group assessment.

\*  $p < .001$ .

\*\*  $p < .05$ .

\*\*\*  $p < .01$ .

The concurrent validity of the keypad data collection, as compared with paper-based administration, was assessed using percent agreement for a series of correlations for the remainder of the variables. When compared across response format, participant's age ( $ICC = .98$ ), class ( $ICC = .92$ ), attitudes toward drinking ( $ICC = .79$ ), frequency of consumption ( $ICC = .85$ ), average quantity of consumption ( $ICC = .92$ ), and frequency of binge drinking ( $ICC = .82$ ) were all highly correlated ( $p < .001$ ). Similarly, when compared across response format, participant's perceptions of typical student attitudes toward drinking ( $ICC = .79$ ), frequency of consumption ( $ICC = .78$ ), and frequency of binge drinking ( $ICC = .76$ ) were all highly correlated ( $p < .001$ ). These preliminary results suggest that the wireless keypad data collection appeared at least as effective as standard paper-based questionnaires. Further, the two techniques yielded comparable correlations among variables within a particular format (see Table 2). Tests of the correlated but non-overlapping correlation coefficients (Raghunathan, Rosenthal, & Rubin, 1996) revealed only 3 of 28 correlations differed by format at  $p < .05$ .

#### 4. Discussion

The present study compared assessments of alcohol consumption and related attitudes using wireless handheld keypads and paper questionnaires administered in a group. The two approaches led to highly correlated responses that did not differ significantly, suggesting that group-based wireless keypad assessment is a suitable alternative to traditional methods. The results of the present study are congruent with similar research that supports electronic-based assessment (i.e., Miller et al., 2002). These wireless assessments provide several benefits. They are cost-effective, easily administered (even to large samples), and relatively free of data-entry errors (Miller et al., 2002).

Beyond the strengths of computer-assisted assessment, the wireless assessment of the present study offers benefits particularly poignant for college populations. The wireless assessment in the current study provided immediate feedback to respondents. Immediate feedback of alcohol use and attitudes to college students allows for “real-time” intervention and decreased resistance to information presented about their own drinking. Students can easily deny that national norms are relevant to them, but feedback from a group of their own friends and classmates may appear markedly more relevant (Korcuska & Thombs,

2003). The OptionFinder system would likely counter some participant resistance to normative data collected by paper-based questionnaires, as data collection, entry, and analysis would be completed using the input from their immediate peers. Therefore, wireless assessment might improve substance use interventions by providing immediate, salient feedback. Further, wireless assessment administration through a software program, such as the OptionFinder System, allows for recognition of group identity regarding alcohol attitudes and use, which can influence alcohol-related behaviors (Rimal & Real, 2003).

One limitation to these data concerns the lack of counterbalancing the order of administration of the items. Future research should counterbalance the order of presentation to control for the influence of order effects. Participants might be more careful in the first rather than the second administration of these questions, for example, regardless of format. In addition, links among these types of data collection and other approaches, including diary assessments, could offer additional support for the validity of this procedure. Despite these caveats, wireless assessment appears to measure individual alcohol use and perceptions as well as paper and pencil surveys. Wireless assessment offers many advantages to users, particularly when immediate and real-time feedback is essential.

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