New technology in quality of life research: Are all computer-assisted approaches created equal?

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Abstract

Objective: To compare alternate form reliability for two previously validated questionnaires using traditional and computer-assisted interfaces (CASI). Methods: The Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) and the allergy-specific Work Productivity and Activity Impairment (WPAI) instrument were combined and formatted for paper-and-pencil (P), computer touch screen (TS), or web-based (WB) administration. Employees at a large midwestern hospital in the US each completed two of three possible formats assigned randomly and in random order. Those completing one of three possible format pairs (P-TS, P-WB, and TS-WB) comprised three study groups. Item response consistency was assessed using Spearman correlations; individuals’ test–retest scores were compared using paired t-tests with mean test–retest differences compared between groups using ANOVA. Results: Seventy five volunteers completed 150 questionnaires. Item response consistency varied by format pair with correlations ranging from 0.566 to 0.973. Although no differences were observed in paired RQLQ responses, participants completing the WB form reported generally higher WPAI scores compared with those from either the paper (p = 0.07) or TS (p = 0.001) format. ANOVA of mean RQLQ and WPAI scores demonstrated no between-group differences. Conclusions: Use of CASI, an increasingly popular method in survey research, may have important effects on instrument reliability. Studies examining this phenomenon more closely are needed to guide future use of CASI in this setting.

Key words: Computer-assisted interviewing, Reliability, Survey research

Introduction

Surveys and survey research have become increasingly popular over the last two decades in assessing beliefs, behaviors and the impact of events that shape public opinion. The technology supporting this practice has also evolved rapidly, allowing access to larger and more diverse populations previously remote to researchers by an increasing number of highly innovative approaches. The widespread availability of computers throughout society, for example, has allowed researchers to use computer-assisted approaches to data collection that most respondents find easy and non-threatening [1–8].

Currently, the Internet is a popular, increasingly used venue for information on health care issues with content accessed directly from informational web-sites or through physicians. Given this trend and increasing computer ‘literacy’ at all levels of society, many researchers have sought to exploit the same computer-based technology to obtain relatively inexpensive insights into consumers’ attitudes and preferences toward the current delivery of health care services.

Several recent reports have suggested the value of computer-assisted interfaces (CASI) in overcoming the logistical and methodological problems associated with other more traditional approaches to survey research [3–5, 7]. Some
researchers suggest, for example, that computer-assisted interfaces (CASI) can be used successfully to obtain responses to sensitive questions that might otherwise be affected by a social desirability bias [3, 4, 7]. The absence of a ‘hard copy’ of responses to sensitive questions and use of individual computer-assisted interviews with audio content delivered by head-phones may contribute to a sense of confidentiality that yields more candid responses and higher item completion rates [7]. The use of computer-based options that enable audio or video presentation may also overcome barriers in accessing populations in which illiteracy or language fluency is a concern. Finally, controlling information about individual questions and use of standardized instructions may lessen concerns about interviewer bias.

Conversely, other studies report that relatively minor design features of the computer interface may affect survey results in unexpected ways [1, 6, 8–12]. Distracting graphics, web-browser incompatibility, or use of formatting that requires horizontal scrolling may, for example, impede an assessment of responses reflecting subjects’ actual preferences or attitudes. Furthermore, changes to these design features or differences in the computer-assisted methods of administration from study to study may introduce additional sources of errors that affect the reliability of a previously standardized survey.

Despite significant technologic advances, gaps in our understanding on the effects of CASI on item response and its ultimate role in survey research remain. Some have assumed, for example, that the reliability of computer-assisted survey administration is equivalent to traditional approaches [13] while others argue that CASI-derived data may be superior especially when the topic is highly sensitive in nature [7].

To establish equivalence between methods of survey administration, test–retest is a commonly used strategy that assesses the correlation of observed responses [14]. Differences in item response using this approach, however, may be related to at least four sources of variation. Kelly and McGrath describe these as (1) real changes in the construct between administrations, (2) natural variation in the construct, (3) changes in measurement methods unrelated to the construct (e.g., respondent fatigue), and (4) the inherent unreliability of the measurement method [15]. While immediate readministration of alternate forms of a survey may minimize real changes or natural variation in measuring the construct of interest and effects of fatigue and other factors in measurement methods can be partially determined through direct observation, few data on the role of CASI in contributing to measurement unreliability exist. The purpose of this study, therefore, is to explore this issue by comparing response correlation using parallel versions of two previously validated surveys administered through traditional paper-and-pencil and computer-assisted interfaces.

**Methods**

**Study measurements**

A 41-item questionnaire was developed by combining two previously validated instruments; the 8-item, allergy-specific Work Productivity and Activity Impairment (WPAI) questionnaire (score range 0–100% impairment by allergies) [16, 17] and the 28-item, Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) (score range 0–6; 0 = no effect; 6 = extremely troubled by allergies in a variety of health-related domains) with seven distinct domains [18]. In addition to these two instruments, the full survey included two questions on the respondent’s age (in 10-year intervals) and gender and three checklist questions on use of non-prescription or prescription-requiring medications (tablet or nasal spray) for allergic symptoms during the preceding week.

Questions from both the WPAI and RQLQ required self-assessment of the effect of allergies in a number of work and social settings using a Likert scale. The scale for subcomponents of the survey differed in length with a 10-point scale used for the WPAI and a seven-point scale for questions in the RQLQ. In addition to questions that required ratings of allergy symptom impact in a variety of settings, the WPAI also included questions requiring respondents to estimate the number of hours spent at work or at school (if applicable) and the number of hours missed in each setting due to problems associated with nose or eye symptoms from allergies.