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Evaluating Tablet Computers as a Survey Tool in Rural Communities

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Abstract

Purpose—Although tablet computers offer advantages in data collection over traditional paper-and-pencil methods, little research has examined whether the 2 formats yield similar responses, especially with underserved populations. We compared the 2 survey formats and tested whether participants' responses to common health questionnaires or perceptions of usability differed by survey format. We also tested whether we could replicate established paper-and-pencil findings via tablet computer.

Methods—We recruited a sample of low-income community members living in the rural southern United States. Participants were 170 residents (black = 49%; white = 36%; other races and missing data = 15%) drawn from 2 counties meeting Florida's state statutory definition of rural with 100 persons or fewer per square mile. We randomly assigned participants to complete scales (Center for Epidemiologic Studies Depression Inventory and Regulatory Focus Questionnaire) along with survey format usability ratings via paper-and-pencil or tablet computer. All participants rated a series of previously validated posters using a tablet computer. Finally, participants completed comparisons of the survey formats and reported survey format preferences.

Findings—Participants preferred using the tablet computer and showed no significant differences between formats in mean responses, scale reliabilities, or in participants' usability ratings.

Conclusions—Overall, participants reported similar scales responses and usability ratings between formats. However, participants reported both preferring and enjoying responding via tablet computer more. Collectively, these findings are among the first data to show that tablet computers represent a suitable substitute among an underrepresented rural sample for paper-and-pencil methodology in survey research.

Keywords

rural; survey methodology; technology; underrepresented

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The use of computer-based and Internet-derived data collection in community-based research has steadily increased.[1] Few would argue that electronic data collection compared to traditional paper-and-pencil methods offers several advantages to the research team, including the elimination of the task of data entry, potential entry errors, and concerns with security and transportation of physical data.[2] These technological advantages,[1] however, have to be balanced with concern about the reliability of the data from some community-based settings, given the evidence of a significant digital divide among various socioeconomic segments.[3,4] Specifically, rural low-income minority residents are more likely to have more limited experience with technology, lower technical and information literacy skills, and less access to technical assistance than others, making data derived with traditional computers more problematic.[4–7] Tablet computers offer the advantages of technology in data collection over paper-and-pencil and may present fewer barriers to research participants with a simpler interface, such as touch screen, zoom, and rotation functions for viewing text and image, than mouse-driven computers. Confirmation, however, that tablet computers are better in data collection and particularly better than paper-and-pencil among rural low-income residents is limited, and the existing studies often have methodological restrictions and low sample size.[8–19] This study fills that gap by providing results from a field study contrasting the 2 methodologies—paper-and-pencil versus tablet computer—among rural, low-income residents and testing whether participants could perform the task of examining and rating posters using touch-based gestures (slider scale) on a tablet computer.

A handful of studies have compared responses collected via a tablet computer versus paper-and-pencil. In one study, participants who were surveyed following Magnetic Resonance Imagining procedures reported no difference in preference for the 2 survey formats.[20] In a second study, college students and medical professionals provided responses more quickly and more accurately when using a tablet computer and rated tablet computers as more usable than paper-and-pencil.[21] These studies, although informative, are limited by low sample sizes (10–20 participants) and by their focus on educated participants who likely were familiar with tablet computers.[19] A recent review concluded that tablet computers offer advantages, but that risks to the integrity of the data may exist when Internet access is unreliable.[1] This study adds to the extant public health literature as we could not identify any other study that has examined the utility of tablet computers compared to paper-and-pencil methodology with a rural, low-income community sample, making this study a relevant contribution to the literature.

Tablet computer use may also present challenges when capturing data from individuals with limited technical and information literacy skills.[6,22] For instance, gestures like pinch to zoom used on tablets have appeal in light of many individuals' limited experience with a computer mouse.[6] Touch-based gestures like those found on tablets may also be useful to an individual with limited knowledge of Likert Scales. The touch-based gestures allow the participant to manipulate the slider scale between 2 extreme points with their finger; thus it may be easier for them to conceptualize the measurement increments. But there is little research to support this technology interface in rural, low-income residents.[23] It is unclear that participants unfamiliar with the technology can successfully provide the nuanced

information being requested. Moreover, evidence of the effect of technological unfamiliarity with tablet computers is mixed. In-depth interviews with 5 investigators representing large health care quality projects praised the flexibility and research potential of tablet computers but also noted that unfamiliarity with tablet computers may limit their utility.[1] In a similar vein, one study suggested that age is generally unrelated to ease of use of tablet computers,[24] whereas another study found that ease of use decreased with age.[25] Clearly, more research is needed to examine the utility of tablet computers.

In this study, we compared responses to surveys administered via paper-and-pencil, the current gold standard of survey research, versus a tablet computer (Apple iPad 2, Apple Inc., Cupertino, California) among participants residing in rural, low-income communities. First, we asked the participants to rate their experience with both data collection formats and whether they prefer one over the other. We hypothesized no difference in preference for paper-and-pencil versus iPad. Furthermore, we expected no differences in perceptions of usability between the 2 formats. Second, we examined whether the 2 data collection formats yield comparable responses on 2 measures commonly used in health research, the Center for Epidemiologic Studies Depression Scale (CES-D)[26] and the Regulatory Focus Questionnaire (RFQ).[27,28]

The RFQ is based on the proposition that goal-directed behavior can have a promotion or a prevention focus. Promotion- and prevention-focused individuals may be motivated to engage in the same behavior but for different reasons. Promotion-focused individuals may be motivated to eat healthy because of the benefits associated with certain foods while prevention-focused individuals may be motivated to eat well because of the costs associated with not consuming those foods.[29] Promotion-oriented individuals may be most responsive to the presence of potentially positive outcomes and choose to adopt strategies to ensure outcomes that match their desired goal. Prevention-oriented individuals may be more responsive to the presence and absence of negative outcomes and may adopt avoidance strategies to steer clear of outcomes that are mismatches with their desired goal.[30,31]

We hypothesized no difference in means or reliabilities of the CES-D or RFQ between the paper-and-pencil and tablet computer formats. Finally, we tested whether data collected via tablet computer replicated earlier research conducted via paper-and-pencil. We asked participants to examine and rate posters from an oral health media campaign using touch-based gestures (slider scale) on a tablet computer. Research finds that people prefer images with happy faces and images with members of their in-group.[32–35] We thus hypothesized that these effects would replicate in research administered via tablet computer. Specifically, we hypothesized that all participants would rate the poster depicting a happy black father and child more positively than they would rate 2 other posters depicting less happy expressions (racially mixed group of male celebrities or a racial minority father walking away from small children)[33] because of biases toward positive expressions. Furthermore, we expected black participants would rate the posters more positively than would white participants because of the in-group positivity bias.[35]

Methods

Participants

Participants were 170 residents drawn from 2 counties meeting the state of Florida's statutory definition of rural with 100 persons or fewer per square mile.[36] We recruited our participants by placing ads via flyers posted around the communities and by a snowball sampling technique in which we encouraged participants to inform others in the community about the study. According to the 2010 Census, the first county had 15,535 residents with a mean per capita income of $13,865 and 18.7% of the population living below the poverty line, with 10.1% of persons age 25 and older having a bachelor's degree or higher.[37] Per the 2010 Census, 75% of residents identified as white, 22% as black, and 3% as other races.[37] The second county had 40,801 residents with a mean per capita income of $18,902 and 22.8% of the population living below the poverty line, with 11.4% of persons age 25 and older having a bachelor's degree or higher.[38] In the second county, 85.5% of residents identified as white, 9.4% as black, and 5.1% as other races.[38] We over sampled blacks as we wanted a representative sample of those who were documented to be disadvantaged and living in the rural South.[39]

A priori power analysis was conducted to find a sample size ensuring enough power to detect a 1-point difference on a 5-point scale in mean responses on the Clarity/Confidence scale between the iPad and paper-and-pencil. Setting type I error rate at 0.01 and power value at 0.8, we determined that a minimum of 160 participants was needed.[40]

Procedures

Our procedures were approved by the University of Florida Institutional Review Board. Participants received a $40 gift card for participation. We conducted the study at 2 local community centers that we set up as controlled laboratory environments with separate areas for consent procedures, data collection, and debriefings. Researchers greeted participants and guided them through the consent procedure. After they consented to participate, a research assistant escorted participants to a second room where they were seated at a in front of a tablet computer (an Apple iPad 2) connected to headphones. Participants listened to instructions relayed through the headphones informing them they would complete several questionnaires as part of the study, either on paper or on a tablet computer. Prior to completing the section requiring iPad use, all participants received a tutorial on the operation of the tablet computer, including a demonstration of how to use the slider scale, scroll, select choices, and adjust the zoom level. Specifically, participants randomized to the iPad initially completed this tutorial before the first section (CES-D) whereas the others completed it immediately before using the iPad.

Following these instructions, we randomly assigned participants to complete the first set of questionnaires via paper-and-pencil or the tablet computer. We implemented randomization using Qualtrics survey software (Qualtrics LLC, Provo, Utah). The first set of questionnaires included the demographic and health items followed by a measure of depression (CES-D). Immediately after completing the CES-D, participants completed items assessing the clarity of the items and their confidence in their responses. Next, we randomly assigned participants

to use paper-and-pencil or the tablet computer to complete a measure of achievement- and loss-relevant motivation (RFQ). Participants were randomized for this section of the study independently of their condition for the CES-D. We chose the CES-D and RFQ because of their broad use and known psychometric properties.

All participants then used the tablet computer to view and evaluate 3 informational posters.[33] This test allowed us to establish the usability of a slider scale with our population.

Finally, participants from the second community used the tablet computer to complete the BRIEF health literacy scale, to report their technological experience, and to complete additional survey format items. The rationale for these additions was to enable a more complete description of the sample. At the completion of the study, we debriefed the participants.

Measures

Demographic Measures

Participants responded to the demographic items: gender, age, race, ethnicity, and education. We also measured financial status with 2 items and created a continuous financial status scale (range = 0–2, with 2 indicating higher financial status).[41] In the first item, participants were asked to describe their financial status as 1 (“I really can’t make ends meet”), 2 (“I manage to get by”), 3 (“I have enough to manage plus some extra”), or 4 (“Money is not a problem; I can buy about whatever I want”). In the second item, the participants were asked to describe how comfortably they would be able to pay an unexpected $500 medical bill. A continuous financial security score was then calculated as the weighted average of the 2 items. Research finds that this financial security measure is a reliable indicator and a significant predictor for many health outcomes.[33,41–44]

Depressive Symptoms

We assessed depressive symptoms using the 10-item CES-D.[26] A typical item read, “I had trouble keeping my mind on what I was doing” (1 = *rarely or none of the time*; 4 = *most or all of the time*). We labeled each response option to assist participants unfamiliar with these types of items. We computed an average score for each participant.

Regulatory Focus

Participants completed the 11-item 2-factor RFQ.[27] The questionnaire has 2 subscales: (1) the *promotion* scale, which measures accomplishment gains, and (2) the *prevention* scale, which measures loss prevention. A typical item read, “Compared to most people, are you typically unable to get what you want out of life?” (1 = *never*; 5 = *very often*). We labeled each response option to assist participants not familiar with these types of items. We summed the scores for each subscale of the RFQ.

Clarity/Confidence

We assessed the clarity and confidence of the 2 formats by asking the following 3 items, “To what extent were the questions clear?” (1 = *very difficult to understand*; 5 = *very easy to*

understand), "To what extent were you confident that your answers were reflective of how you truly felt?" (1 = *very unsure*; 5 = *very confident*), and "How confident are you that you could answer these questions in the future?" (1 = *very unsure*; 5 = *very confident*). We averaged these 3 items to create a measure of Clarity/Confidence (range 1–5).

Poster Evaluation

We asked all participants to evaluate 3 posters using a slider scale on the tablet computer. Participants evaluated the posters with an item developed ad hoc for this study that read, "What is your overall impression of the poster?" (0 = *absolutely hate it*; 100 = *absolutely love it*).

Health Literacy

We measured health literacy using the 4-item BRIEF, which contains items such as, "How often do you have someone help you read materials from your health care provider?" (1 = *never*; 5 = *always*).[45] The BRIEF has adequate reliability, with Cronbach's alpha typically >0.70 ($\alpha = 0.74$ in our sample).[29,46] The scale permits classification of participants into 3 groups based on their level of health literacy: inadequate, marginal, and adequate. Health literacy is strongly associated with general literacy.[10] We computed an average score for each participant. This measure was administered to the second community only.

Technological Experience

We measured technological experience using 3 items developed ad hoc for this study that asked participants how much prior experience they had with: (1) desktop and laptop computers, (2) tablet computers, and (3) iPads. Participants responded using a 5-point scale anchored by 1 = *no experience* and 5 = *extensive experience*. We analyzed each item separately. This measure was administered to the second community only.

Survey Format Preferences

We created several ad hoc items to assess survey format preferences. We asked all participants if they would rather complete the survey using paper-and-pencil or the iPad (1 = *paper-and-pencil*, 2 = *iPad*, 3 = *no preference*). We asked participants in the second community to evaluate both paper-and-pencil and iPad formats using 3 pairs of items. The items read, "Overall, I feel I can successfully complete a survey using [iPad or paper-and-pencil]." (1 = *strongly disagree*; 5 = *strongly agree*), "Overall, how much did you like responding via [iPad or paper-and-pencil]?" (1 = *strongly disliked*; 5 = *strongly liked*), and "Overall, how difficult was using [iPad or paper-and-pencil] to respond to questions?" (1 = *not difficult at all*; 5 = *extremely difficult*). We analyzed each item pair separately.

Data Analysis

An independent samples *t* test was conducted to compare the mean responses of the Clarity/Confidence measure; the 2 groups are those who completed both CES-D and RFQ scales using iPad and those who completed the same 2 scales using paper-and-pencil. The second randomization of participants for the RFQ scale, following the first randomization to formats for the CES-D scale, potentially yielded 4 groups: iPad/iPad; iPad/paper-and-pencil; paper-

and-pencil/iPad; and paper-and-pencil/paper-and-pencil. That is, participants randomized to the iPad format to answer the CES-D items could have been randomized to the iPad again to answer the RFQ items (ie, iPad/iPad). We tested the means for these 4 groups for the RFQ scales using one-way ANOVA and found no difference among the means (all *P* values greater than .85). Therefore, all subsequent analyses for the RFQ scales were performed based on 2 groups: iPad versus paper-and-pencil formats. We also conducted *t* tests to examine differences in format preferences. Chi-square tests were used to assess preferences for future survey formats.

We assessed internal consistency of the CES-D and RFQ scales using Cronbach's alpha. We used the Fisher-Bonett test to examine whether Cronbach's alpha for the scales were equivalent after adjusting for demographic variables including age, gender, race, and education.[47] We used mixed-factorial ANOVAs with planned comparisons for testing differences between the 3 posters in evaluations, with the Bonferroni correction. All analyses were performed using SAS 9.3 (SAS Institute Inc., Cary, North Carolina) or IBM SPSS Statistics 20 (IBM Corporation, Armonk, New York).

Results

Demographic Information

Table 1 presents the demographic characteristics of our sample. The average age of the participants was 55.8 years (SD = 11.9) and 59% were women. The race distribution of the sample was 49% black, 36% white, and 13% other race. The majority (91%) of the participants were non-Hispanic. Twenty percent of the sample reported less than a high school education and another 39% reported a high school education. The financial security score was 0.54 (SD = 0.41) for our sample. We found that 86% fell between a mean of 0 and 1 and 11% between 1.1 and 2.0.

The BRIEF health literacy scale collected only in the second community showed that 28% of participants were classified as having inadequate health literacy, 37% were classified as having marginal health literacy, and 35% were classified as having adequate health literacy. The average health literacy score of our second community fell in the marginal range (M = 2.26, SD = 0.86). Regarding technological experiences, participants from the second community reported some experience with desktop and laptop computers (M = 2.58, SD = 0.99), but little experience with tablet computers (M = 1.84, SD = 1.00) and iPads (M = 1.51, SD = 0.79) in particular.

iPad Versus Paper and Pencil

The mean responses for the Clarity/Confidence measures were 4.43 (SD = 0.73) for iPad and 4.36 (SD = 0.68) for paper-and-pencil. Analysis revealed that participants' Clarity/Confidence ratings for the iPad and paper-and-pencil did not significantly differ (*t*s = 0.43, *P*s = .67, *d*s < 0.05). Participants showed a significant preference for the tablet computer over paper-and-pencil, $\chi^2(2, N = 164) = 21.93$, $P < .01$. Specifically, 48% of participants preferred using the tablet computer over paper-and-pencil method (82 preferred the tablet computer, 34 preferred paper-and-pencil, 48 had no clear preference, 6 provided no

responses). Furthermore, participants reported no differences in preferences by race (white vs black χ^2 (2) = 5.39, P = .07, ϕ = 0.03), gender (χ^2 (2) = 0.85, P = .65, ϕ = 0.14), or age groups (χ^2 (8) = 8.82, P = .36, ϕ = 0.17). Participants from the second community were asked the additional 3 pairs of questions. First, we found no significant difference in beliefs regarding their ability to successfully complete a survey via the iPad (M = 4.13, SD = 0.85) versus paper-and-pencil (M = 4.13, SD = 0.84), t(99) < 0.001, P > .99, d < 0.001. Second, we found no significant difference in the difficulty responding to questions via the iPad (M = 1.31, SD = 0.49) versus paper-and-pencil (M = 1.19, SD = 0.58), $t(100)$ = 1.75, P = .08, d = 0.18. Third, we found a significant difference in "liking responding" via the iPad (M = 4.03, SD = 0.81) versus paper-and-pencil (M = 3.65, SD = 0.86), t(97) = 3.66, P < .01, d = 0.45.

Means and Reliabilities for CES-D and RFQ

The mean responses to the CES-D (Table 2) were similar for participants who responded via paper-and-pencil and participants who responded via the tablet computer, t(168) = 1.33, P = .19, d = 0.21. Moreover, the mean responses on the CES-D for these 2 formats were comparable to the mean responses we observed in a prior sample of similar participants who completed the CES-D using paper-and-pencil (M = 1.15, SD = 0.54, ts < 1.45, Ps > .15, ds < 0.22).[48] The Cronbach's alphas were 0.79 and 0.80 for paper-and-pencil and iPad, respectively. Analysis revealed no significant difference between formats in the reliability of the CES-D scale, z = 0.13, P = .45, d = 0.03.

The mean responses to the RFQ (Table 2) were similar across formats. Specifically, we observed no difference in responses to the RFQ promotion scale between participants who responded via paper-and-pencil and participants who responded via tablet computer, t(168) = 0.53, P = .59, d = 0.08. As with the CES-D, the mean responses on the RFQ promotion subscale for these 2 formats were comparable to the mean we observed in a prior sample of similar participants who completed the RFQ using paper-and-pencil (M = 19.97, SD = 2.92; ts < 0.55, Ps > .58, ds < 0.08).[41] We also observed no difference in responses to the RFQ prevention subscale between participants who responded via paper-and-pencil and participants who responded via tablet computer, t(168) = 0.48, P = .63, d = 0.07. Furthermore, the mean responses on the RFQ prevention subscale for these 2 formats were comparable to the mean we observed in a prior sample of similar participants who completed the RFQ using paper-and-pencil (M = 16.06, SD = 3.52; ts < 0.50, Ps > .62, ds < 0.08).[32]

We tested whether the reliability coefficients for the RFQ subscales were comparable across formats using the same method we used to compare the reliabilities for the CES-D measure. The Cronbach's alpha for the promotion and prevention subscales were similar for both formats. For the promotion scale, the Cronbach's alphas were 0.49 and 0.57 for paper-and-pencil and iPad, respectively. For the prevention scale, the Cronbach's alphas were 0.73 and 0.75 for paper-and-pencil and iPad, respectively. Analysis revealed no significant difference between formats in the reliability of the promotion (z = 0.70, P = .24, d = 0.12) and prevention (z = 0.29, P = .39, d = 0.05) subscales.

Poster Evaluation

We found a significant effect on participants' ratings of their overall impression of the poster, $F(2, 306) = 3.37$, $P = .04$, $\eta^2 = 0.02$. Planned comparisons revealed that participants rated the smiling father and child poster more positively than they rated the other 2 posters, $F(1, 153) = 7.73$, $P = .01$, $\eta^2 = 0.05$. Analyses also revealed that black participants rated the posters more positively than did white participants, $F(1, 140) = 15.47$, $P < .001$, $\eta^2 = 0.10$.

Discussion

Key Findings

We found a clear preference for tablet computers over paper-and-pencil among our participants. We found no significant differences in mean responses and reliabilities of the CES-D and RFQ scales for participants using traditional paper-and-pencil format versus tablet computers. As hypothesized, participants were able to make preference-based discriminations between the posters using the slider scale function of the touch pad. Collectively, these findings suggest that tablet computers represent a suitable substitute for paper-and-pencil in survey research.

Demographics

Our participants were from 2 counties meeting the state of Florida's statutory definition of rural. The racial composition of the sample was different from the state overall, with 49% of our sample self-identifying as black compared to 16.6% of the state. The mean financial security for our sample was 0.54, which is lower than that reported by Riley et al[41] and Kurti et al[44] (in the range of 0.8 to 1.20), with 86% below a mean of 1 on a 0–2 scale, suggesting a high level of financial disadvantage. In short, the sample was less educated and had lower income than the state as a whole, and participants resided in rural counties. Thus, the demographics of our sample were consistent with our goal to compare iPad versus paper-and-pencil survey formats in a representative sample of disadvantaged individuals living in the rural South.

iPad Versus Paper and Pencil

The participants in our study preferred responding via tablet computer over paper-and-pencil, which indicates acceptance of tablet computers as a survey tool and perhaps presents an opportunity to use tablet computers to facilitate participant recruitment. The reader is reminded that we found no difference between the 2 formats on the Clarity/Confidence scale, further increasing our confidence in the use of tablet computers in a rural and low-income sample. Features of tablet computers, such as the ability to easily increase the size of an image on screen, and the novelty of the device, may make it a more powerful tool than paper-and-pencil and laptop computers. In short, collecting data via tablet computers provides numerous advantages over traditional field research paper-and-pencil methods with relatively few drawbacks.

Means and Reliabilities for CES-D and RFQ

The absence of differences between paper-and-pencil and tablet computers in the mean responses and reliabilities for the CES-D and RFQ scales suggests that tablet computers are appropriate substitutes for paper-and-pencil formats in rural, low-income groups. Researchers typically report high Cronbach's alpha for the CES-D (ranging from 0.85 to 0.90), which is in line with our findings.[49] It is noteworthy, however, that Cronbach's alpha was low for the promotion subscale of the RFQ. The low alpha may be due in part to the low literacy of our sample. Using the BRIEF to separate participants by literacy group in the second community revealed the lowest reliability coefficient for participants classified as having inadequate literacy skills ($\alpha = 0.28$), followed by participants classified as having marginal literacy skills ($\alpha = 0.49$) and participants classified as having adequate literacy skills ($\alpha = 0.66$). This explanation is tentative as we did not hypothesize such an effect nor was the health literacy scale administered to all participants. On the other hand, if the finding holds in other samples, the RFQ scales may not be appropriate for use with low-literacy samples.

Poster Evaluation

We confirmed that the participants were able to rate the posters in the direction hypothesized using the iPad touch screen (slider scale). Not surprisingly, participants rated the poster showing the image of a smiling father and 2 small children more highly than they rated the other images. This finding is consistent with other unpublished results available from the authors[32] and from findings from established affect research.[34] In addition, the black respondents in this study gave more positive ratings to the posters than did the white respondents. This outcome is consistent with work showing that people tend to rate images most similar to themselves more positively than those which are dissimilar. For example, blacks tend to be more positive toward black images.[35] This interpretation is speculative, but our finding of such hypothesized differences supports the value of the iPad technology in community-based research where this type of responding to make comparisons or preferences is desired.

Strengths and Limitations

Our sample consisted primarily of a convenience sample of often hard-to-recruit rural, adult, lower-income, and minority participants, which is both a strength and a limitation. The strength of this study is the inclusion of this often hard-to-reach group. On the other hand, the limitation is that the inclusion of this group may limit the generalizability of our results. Indeed, recent research suggests that low-income groups tend to have lower health literacy and thus show the greatest benefits from interactive information technology.[50] Participants in 1 of the 2 communities were tested and found to be low in health literacy and technological experience, confirming the contentions that low-income groups residing in rural counties tend to have low literacy scores. It is of note, however, that these low-literacy respondents quickly developed the necessary skills and interest to respond to items via tablet computers. In this study, we provided instructions and example items designed to give participants experience using different tablet features, which proved to be a strength. Importantly, another strength of our study was that participants responded to more than one

type of measure (items measuring dispositions, attitudes, preferences, demographic characteristics), suggesting that the results for tablet computers likely generalize to other types of survey items. However, our items addressing usability of the survey formats were created ad hoc for the study. Although these items possess face validity and were designed to facilitate ease of understanding for participants, they were not drawn from a validated instrument. We acknowledge this as a methodological limitation. However, as our findings with the RFQ demonstrate, issues do exist with scales that have not been validated on groups similar to our population of interest. Finally, we demonstrated that a field study can be conducted with the same rigor as randomized laboratory research (eg, setting and procedural rigor).

We also acknowledge that data collection via tablet computers and survey software presents limitations. Electronic data collection produces no backup physical records; thus, data may be unable to be recovered if lost. Additionally, the cost of tablet computers and online survey software is expensive relative to the cost of a paper-and-pencil survey. However, many universities and organizations offer subsidized licenses to survey software for research purposes. Survey software may also require Internet access for online data collection, which may be a challenge in areas with limited or unreliable Internet connections. Furthermore, the initial tablet outlay can be amortized in less than 7 months or by replacing around 1,700 pages of printed content.[12]

Conclusions and Recommendation

Our findings are relevant for investigators conducting community-based public health research in rural, low-income communities, especially with disadvantaged minority populations. We add to the literature by demonstrating 3 important findings. First, we show that participants respond to scales similarly using either a tablet computer or paper-and-pencil. Second, participant responses via tablet computer replicate earlier research using paper-and-pencil methods. Third, participants rated tablet computers at least as usable as paper-and-pencil. Thus, our findings add to the growing body of evidence suggesting that tablet computers are a suitable alternative to paper-and-pencil measures. Although many researchers have already begun using tablet computers for survey research, simply conducting studies using this survey format is no guarantee of equivalence with other formats, a concern we address with our findings. We show tablet computers are effective even when participants are unfamiliar with computer-based technology and address some of the concerns about data integrity raised by other researchers.[1] Based on our findings, rural and low-income residents can successfully use iPads for data collection when they receive adequate instructions. We conclude that tablet computers produce equivalent data and offer benefits and few costs (outside the initial outlay to purchase the tablet and survey software) in conducting community-based research with rural, low-income residents.

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Table 1

Demographic Characteristics of the Sample

Variable		n	%
Gender	Male	68	40
	Female	100	59
	Missing	2	1
Age	25–39	14	8
	40–50	41	24
	51–60	55	33
	61–70	34	20
	Over 70	22	13
	Missing	4	2
Race	Black or African American	84	49
	White	61	36
	Other	22	13
	Missing	3	2
Ethnicity	Hispanic	6	3
	Non-Hispanic	154	91
	Missing	10	6
Education	Less than a high school degree	34	20
	High school graduate	67	39
	Some college	48	28
	College degree (AA, BS, or graduate/professional)	20	12
	Missing	1	1
Financial security (range 0–2)	0–1.0	147	86
	1.1–2.0	18	11
	Missing	5	3

Note : n = 170.

Table 2

Responses to the 2 Survey Formats

	Paper-and-Pencil		Tablet Computer				
	M	**SD**	**M**	**SD**	***t***	***P***	***d***
CES-D scale	1.10	0.54	1.21	0.54	1.33	.19	0.21
RFQ – promotion	20.09	3.04	19.85	3.04	0.53	.59	0.08
RFQ – prevention	16.19	3.37	15.93	3.37	0.48	.63	0.07