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Focus on Methodology: Beyond paper and pencil: Conducting computer-assisted data collection with adolescents in group settings

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ABSTRACT

Computer-assisted data collection offers advantages over traditional paper and pencil measures; however, little guidance is available regarding the logistics of conducting computer-assisted data collection with adolescents in group settings. To address this gap, we draw on our experiences conducting a multi-site longitudinal study of adolescent development. Structured questionnaires programmed on laptop computers using Audio Computer Assisted Self-Interviewing (ACASI) were administered to groups of adolescents in community-based and afterschool programs. Although implementing ACASI required additional work before entering the field, we benefited from reduced data processing time, high data quality, and high levels of youth motivation. Preliminary findings from an ethnically diverse sample of 265 youth indicate favorable perceptions of using ACASI. Using our experiences as a case study, we provide recommendations on selecting an appropriate data collection device (including hardware and software), preparing and testing the ACASI, conducting data collection in the field, and managing data.

Technological advances are transforming the research process. Instead of filling out paper and pencil surveys, respondents can complete questionnaires on computers or other electronic devices (Brown, Vanable, & Eriksen, 2008; Couper, 2005; Wilcox, Gallagher, Boden-Albala, & Bakken, 2012). Computer-assisted data collection offers multiple advantages over traditional paper and pencil measures to both researchers and respondents (Jones, 2003; de Leeuw, Hox, & Kef, 2003). Advantages to researchers include improved data quality and savings of both time and money on data entry and checking. Respondents also benefit; computerized data collection affords privacy and (if an audio component is incorporated) reduces the burden on respondents who have limited reading proficiency. For these reasons, computer-assisted data collection may offer an attractive alternative to paper and pencil measures (e.g., self-administered questionnaires, machine-readable scantrons). This is particularly true when studies have large samples or involve multiple data collection points (Brown

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et al., 2008). As affordable technological options proliferate, there is a growing need for practical guidance on field implementation for researchers conducting computer-assisted data collection, particularly those collecting data from groups of respondents. Yet as we found when embarking on a large-scale study with adolescent participants, such guidance is scarce. To address this gap, we describe our experiences implementing computer-assisted data collection with adolescents in group settings, and share lessons learned throughout the research process.

Computer-assisted data collection: an overview

Numerous articles discussing methodological and technical aspects of computer-assisted data collection have been published. These articles typically evaluate specific devices (e.g., Galvez, Mankowski, Braun, & Glass, 2009; Jaspan et al., 2007) or discuss the process of setting up data collection systems (Edwards et al., 2007; de Leeuw et al., 2003; NIMH Multisite HIV/STD Prevention Trial for African-American Couples Group [NIMH], 2008). Most, however, only briefly describe the logistics of implementing computer-assisted data collection (e.g., decision points researchers confront, tips for ensuring data collection sessions go smoothly). An exception is de Leeuw et al. (2003), who presented three case studies illustrating how different types of computer-assisted systems were implemented with various youth populations. This type of in-depth, pragmatic discussion is extremely valuable to researchers, but the rapid evolution of technology makes constant updating necessary. Given space constraints, reports of empirical studies generally include little information about decisions and procedures involved in implementing computer-assisted data collection. As a result, the extent to which researchers can benefit from other teams' experiences and avoid repeating their mistakes is limited.

Computer-assisted data collection may be particularly appropriate in studies of adolescents, who have typically grown up with, and are comfortable using, technology (see Prensky, 2006). Indeed, a growing number of studies conducted with adolescents involve collecting self-report data using Computer-Assisted Self-Interviewing (CASI) or Audio Computer-Assisted Self-Interviewing (ACASI). The two are similar in that questions are presented on a computer screen and study participants enter responses directly, but with ACASI, respondents also hear the questions over headphones (Brown et al., 2008; de Leeuw et al., 2003; Trapl et al., 2005). In conducting our literature review, we identified over 50 articles published in the *Journal of Adolescence* and the *Journal of Research on Adolescence* (two leading publications in the field of adolescent development) that reported on studies using computers to collect self-report data from adolescents (full list available from first author). Only a handful of these studies collected data from adolescents in group settings, such as schools or out-of-school programs. Many of the articles reported secondary analyses of data from national studies (e.g., National Longitudinal Study of Adolescent Health, National Longitudinal Survey of Youth), which typically administered a subset of measures on sensitive topics via ACASI during individual interviews. Several others involved individual data collection, primarily in home settings (e.g., Giordano, Manning, & Longmore, 2010) or service agencies such as homeless shelters (e.g., Gwadz, Nish, Leonard, & Strauss, 2007). Some articles did not describe study procedures in sufficient detail to ascertain whether data were collected individually or in groups. As best we could determine, four studies involved some form of group data collection. Two studies administered ACASI to groups of students in school settings: the Multisite Violence Prevention Project (basis for several articles; e.g., Mehari & Farrell, 2015) and the Healthy Teens Longitudinal Study (Orpinas, Horne, Song, Reeves, & Hsieh, 2013). Two other studies used CASI for school-based administration (Cvencek, Nasir, O'Connor, Wischnia, & Meltzoff, 2015; Jose, Ryan, & Pryor, 2012). In these articles, the implementation process was briefly described in the procedures section.

On the basis of this review, it is evident that computer-assisted data collection has been successfully implemented with groups of adolescents. As technology becomes more ubiquitous and researchers strive to make studies appealing to adolescents, the use of computer-assisted data collection is likely to increase. Given that developmental researchers often collect data in group settings for logistical and cost reasons (e.g., scheduling constraints of research partners, researcher-to-participant ratios), the lack of published information about conducting computer-assisted data collection in group settings may represent a barrier to some researchers. To address this gap, we describe the implementation of computer-assisted data collection with groups of adolescents in our recently completed study – the Pathways Project. We begin by providing an overview of the logistics of implementing ACASI, highlighting the types of decisions researchers are likely to confront at different stages of the research process and describing lessons learned. We then present preliminary data on adolescents' reactions to the data collection experience. We conclude by making recommendations for implementing computer-assisted data collection with groups of adolescents.

Implementing computer-assisted data collection in the Pathways Project

The Pathways Project is a mixed methods, multi-informant, longitudinal study of adolescent development. The study was conducted in 14 youth programs in two Midwestern states. Programs were diverse, varying in size (from 9 to 74 youth), type (e.g., school-based, agency-based, stand-alone), and focus (e.g., arts, leadership, science/technology). Questionnaires were completed by youth at four time points across a program cycle (typically a school year), with most data collection occurring during program time. To minimize disruption of program activities and allow for efficient data collection over the course of the study, questionnaires were administered to groups of youth. We did not originally plan for computer-assisted data collection; however, during a pilot study we became concerned that youth would get tired of completing paper and pencil questionnaires with between 120 and 150 items at each of four time points. We also worried about potential reading

difficulties, given that our target sample consisted of adolescents from diverse socioeconomic and ethnic backgrounds, including youth from immigrant families. Moreover, we planned to collect approximately 1,000 questionnaires from youth over the course of the study (target sample of 240 youth assessed at four time points); entering and checking these questionnaires manually would have taken considerable staff effort. Therefore, we obtained permission from our funder to reallocate funds and conduct computer-assisted data collection.

In the following sections, we describe our experiences implementing computer-assisted data collection, focusing on three stages of the research process (preparation, data collection, and data management). We do not discuss issues that are common to any study, such as sampling, recruitment, or measures selection. Furthermore, given the speed of technological advances, we do not address issues specific to the selected computer model (ASUS 10.1″ netbooks) and ACASI program (MediaLab v2010). Instead, we concentrate on decisions and issues associated with computer-assisted data collection.

Before going into the field: preparation

The main steps before going into the field involved selecting a data collection device, programming the data collection tool, and preparing research staff and partners for implementation.

Selecting a data collection device

Small laptops (netbooks) were selected as the data collection tool after evaluating available technologies. This decision was based on several considerations. For example, although handheld devices are inexpensive and easy to transport, the small screen size makes reading and typing difficult for longer surveys (Haller, Haller, Courvoisier, & Lovis, 2009). Based on the expected range of reading levels in our target sample, we opted to include an audio component, which imposed hardware and memory constraints. Touch screen devices offer an alternative to conventional laptops (e.g., Edwards et al., 2007) but at the time our study began, such devices were still very expensive. Cost was an issue as we required 60 units to allow for data collection at the three study sites (one in Minnesota, two in Illinois), each of which collected data from 2 to 3 programs during each year of the study. We also considered an online platform (e.g., Lefever, Dal, & Matthíasdóttir, 2007), but were not confident that all programs would have reliable Internet access (as turned out to be the case).

The laptops functioned well, but several unanticipated issues arose. Because of the number of devices needed for efficient data collection at larger programs, transportation and storage posed a logistical challenge at some field sites. Furthermore, two laptops became unusable, and without funds for replacements, we had to get by with fewer computers over the course of the study. Another issue was that some youth disliked the reusable headsets we purchased, preferring to use their personal headphones when completing the ACASI.

Preparing the data collection tool

We began by developing paper versions of the questionnaires. (These were later used as a backup if youth could not complete the ACASI for any reason.) Identity check questions (gender, initials, date of birth) were included as a safeguard against incorrectly recorded participant ID codes. Instructions, questions, and response options were worded identically on the paper and computer versions, but the ACASI version reflected recommendations for computerized survey design (e.g., Austin, Richter, & Reinking, 2008; Baatard, 2012; NIMH, 2008; Tourangeau, Conrad, & Couper, 2013). For example, questions were presented one at a time rather than as a set, and audio instructions periodically stated how many sections remained to give respondents a sense of their progress (indicated with page numbers on the paper version). The programming took advantage of available features like skip patterns (e.g., if a youth was not employed then a follow-up question about how many hours a week they worked was automatically skipped) and specification of valid values (e.g., if a response scale had a possible range of 1–5, youth who entered out-of-range values were prompted to enter a value between 1 and 5). In pilot-testing the ACASI with staff, we noted that having the response buttons in the same location on successive screens made it easy, and possibly tempting, to select the same response repeatedly without reading or listening to the entire question. Consequently, placement of response buttons varied from question to question. Voice recordings of male and female project staff were used for the audio component of the ACASI. Staff were recorded while reading from prepared scripts that incorporated instructions and questions from the paper questionnaire. The audio was added to the ACASI program so that the appropriate audio began when the corresponding question appeared on the screen.

Multiple steps were taken to ensure errorless operation and data capture. Several staff members checked that the questions and responses on the ACASI mirrored the paper version of the instrument, and that the audio recordings properly corresponded with the questions on the screen. Staff also completed mock questionnaires with different pre-assigned responses to test for ACASI functionality (e.g., skip patterns) and verify that data were being captured correctly. By comparing the pre-assigned responses with the outputted data files, we ensured data were properly recorded.

The ACASI worked well but we did confront several issues. To reduce respondent burden, the second and third questionnaires were shorter than the first and fourth questionnaires. In addition to increasing programming time, having multiple versions of the questionnaire was potentially problematic during data collection sessions. For example, staff had to remember to open the correct version of the questionnaire file; in several cases, youth completed the wrong questionnaire, resulting in some data loss. One solution would have been to load only the needed version of the questionnaire onto laptops prior to each data collection session, or configure folders containing unused versions so they were “hidden” or otherwise flagged. However, programs entered the study at different times depending on their cycles, so multiple versions of the questionnaire were in use

simultaneously (e.g., baseline data collection could occur at one program the same week another program completed Time 2 questionnaires). Because of this, it would have been difficult to ensure that all laptops contained only the needed version prior to each data collection session. Having different versions also created complications if youth entered the study late (e.g., youth who joined a program after baseline data collection had occurred). Moreover, despite saving a tremendous amount of time on data entry and checking, preparing the outputted data for analysis required considerable effort because the program we used had limited options for specifying output formats of variables (e.g., string vs. numeric). Finally, we wished we had included an item on the ACASI indicating whether participants completed the questionnaire on laptop or paper (instead of having to add an indicator to the SPSS data files).

Preparing for implementation

To ensure consistency across the study sites, and provide continuity despite anticipated staff turnover during several years of field work, written protocols were created. For example, the "ACASI protocol" included detailed directions for setting up laptops, opening the ACASI program, and downloading data. We engaged in group brainstorming to identify and address various contingencies (e.g., what happened if computers went to sleep after the ACASI program was opened, scenarios for interrupting the survey or dealing with computer problems). The "Roles Table" (discussed in the next section) specified staff responsibilities during data collection. Protocols were tested in the lab to ensure they made sense to all research team members.

Data collection sessions were typically conducted by a mix of research staff, senior investigators, graduate students, and undergraduate research assistants. Because we were collecting data from ethnically diverse youth, we ensured that data collection teams included individuals from a range of ethnic backgrounds. Whenever possible, we included undergraduate students as their closeness in age to our adolescent participants facilitated rapport. Before each session, the field site coordinator convened the data collection team and reviewed the protocols and procedures. Team members were reminded not only of the mechanics of data collection but also the goals of collecting the best data possible and providing a positive experience for study participants. One staff member was responsible for checking the equipment (e.g., ensuring batteries were charged and questionnaires loaded correctly) and packing up the laptops and peripherals.

The field site coordinator worked with the program leader (or other contact person) to set up data collection sessions. To ensure that ethical requirements regarding parental consent were met, and allow accurate identification of adolescents over time, the field site coordinator prepared an alphabetized Name/ID list of eligible youth. At the first time point, this included all program participants who had attended an information session and whose parents had not opted them out of the study. At later time points, the Name/ID list flagged youth who had dropped out of, or were new to, the program.

In the field: data collection

The same data collection protocol was followed at all programs. However, specific procedures were tailored in response to program needs, which often evolved during the course of the study. For example, at some programs each questionnaire session occurred in a different physical space, requiring the team to adjust to a novel setting. In other cases there were changes in the format of data collections to accommodate program activities; for example, from large to small groups, which necessitated spreading data collection over several days. At the largest programs, we did not have enough laptops for all youth to complete the questionnaire simultaneously, so staff scheduled multiple sessions (either back-to-back or on separate days). At some programs youth did not all arrive together, allowing data collection to be spaced across several hours. In contrast, other programs allocated limited time for data collection, requiring maximum efficiency. We found that regardless of the setting, close coordination with the program leaders, advance planning, and flexibility were critical to successful data collection.

To illustrate the most challenging type of data collection we encountered, we describe a prototypical questionnaire session where the team was allotted a 55 min period to collect data from approximately 30 youth, with an additional 45 min for set up and breakdown. These time constraints were characteristic of after-school programs (whether school-based or community-based) that youth attended for a fixed period of time. Each stage of the process is displayed in Table 1 and described below. To maximize efficiency, team members were pre-assigned roles for each phase of the data collection. A general ratio of 1 staff member for every 5 or 6 youth was found to be ideal, particularly during early data collection sessions when youth (and staff) were unfamiliar with study procedures. At later data collections and smaller programs, the roles would be allocated to fewer staff members; for example, Persons #4 and #5 would be dropped, and the Field Site Coordinator (Person #6) would lay out materials during the set up period.

Set up

Thirty minutes before the scheduled session, the research team arrived with rolling suitcases full of laptops and supplies, and team members jumped into their assigned roles. If necessary, furniture was arranged by Persons #3 and #5 to give youth privacy during data collection (e.g., desks were spaced out or arranged so computer screens faced away from each other). These physical arrangements also minimized potential interactions between respondents during data collection (as did the use of headsets and the self-paced nature of the ACASI). Persons #1, #2 and #4 put out computers, turned them on, and logged in; Persons #1 and #2 then loaded the questionnaire. Person #3 followed, attaching peripherals (mice and headphones) to each computer then checking that each computer's identification number was visible

Table 1
Sample roles table for prototypical data collection with 30 youth.

	Person #1	Person #2	Person #3	Person #4	Person #5	Person #6 (field site coordinator)
3:00–3:30 p.m. Set up	Set out laptops; turn on/log in	Set out laptops; turn on/log in	Arrange furniture; attach peripherals; check laptop IDs	Set out laptops; turn on/log in	Arrange furniture; lay out materials; help Field Site Coordinator	Set up payment and snack tables, oversee set up, monitor time
3:20–3:30 p.m. Youth arrival	Load questionnaire	Load questionnaire	Greeter	Greeter		
3:30–3:40 p.m. Welcome & assent	Introduce self	Introduce self	Introduce self; settle latecomers	Introduce self	Introduce self	Lead welcome and assent
3:40–3:50 p.m. Getting started	Start youth on questionnaires	Start youth on questionnaires	Start youth on questionnaires	Start youth on questionnaires	Start youth on questionnaires	Attend to special situations
3:50–4:25 p.m. Questionnaire session	Answer questions	Answer questions	Answer questions	Answer questions	Answer questions	Compile & check documents
	Help youth exit program	Help youth exit program	Checkout youth at payment table	Help youth exit program	Checkout youth at payment table	Checkout youth at payment table
4:25–4:40 p.m. Data downloading & break-down	Download data, shut down laptops	Download data, shut down laptops	Pack up laptops and supplies; rearrange furniture	Download data, shut down laptops	Pack up laptops and supplies; rearrange furniture	Final document check
		Pack up laptops and supplies				Room check

(and if not, affixing a sticky note with the number). Person #5 distributed materials (e.g., assent packets, pens) and assisted the field site coordinator (Person #6). In addition to providing general leadership and answering questions from program staff or research team members, the coordinator set up payment and snack tables (near entrances/exits) and monitored the time to ensure the team was on schedule.

Youth arrival

Typically, participants were congregating in a nearby room or hallway toward the end of the set up period. When their assigned set up tasks were complete, Persons #3 and #4 acted as "greeters," talking to waiting youth and escorting them to seats once the room was ready.

Welcome and assent

When all youth were seated, the field site coordinator would get everyone's attention with a warm welcome and ask research team members to introduce themselves. The coordinator then introduced the study and led youth through the assent process (or, at later data collections, reminded them what the study was about). One team member (Person #3) greeted latecomers and directed them to seats.

Getting youth started on ACASI

Getting participants started on the ACASI required focus and calm. Because the Pathways Project was longitudinal, youth had to be accurately identified at each time point. To assure youth that their privacy was protected, ID numbers were used to identify questionnaires. This created a potential bottleneck because research participants were all ready to begin at the same time, but a team member needed to enter each youth's ID into the ACASI program. To minimize the amount of time participants had to wait, everyone but the field site coordinator helped get youth started.

Following the written protocol, a researcher asked each participant's name, located it on the Name/ID list, and typed the ID into the ACASI, then asked the participant to put on headphones and (when ready) start the questionnaire. The researcher noted the computer number on the Name/ID list to document on which laptop that youth's questionnaire was stored. The field site coordinator's role during this time was to deal with special situations that might arise.

Questionnaire session

While youth were completing the ACASI, the research team moved to the periphery of the room and waited quietly to help youth if they had questions or problems. During this time, the field site coordinator compiled information from each staff member's copy of the Name/ID list into a master list, double-checking that computer identification numbers were recorded (and if not, getting the information before participants left their seats). In the (unusual) event of computer problems, youth either moved to a different computer or completed the questionnaire on paper.

Because the ACASI was self-paced, youth took different amounts of time to complete the questionnaire. The last screen instructed participants to let a researcher know when they had finished. Persons #1, #2, and #4 helped youth exit the ACASI program and directed them to a payment table where other team members collected and recorded paperwork (e.g., assent forms), gave youth their incentive (e.g., gift card or cash), and collected a signed receipt.

Data downloading and breakdown

To guard against potential data loss, completed questionnaires were downloaded onto flash drives at the field site. We learned to wait until most participants had finished before starting to download data, or remaining participants might feel rushed or get distracted. Seasoned staff members downloaded data onto flash drives, then shut down the computer and moved on while other staff packed up the equipment and (if necessary) rearranged the furniture. During this time, the field site coordinator compiled and double-checked payment and document information from the various payment stations onto the master list. When everything was packed up, the coordinator made sure the space was left as we had found it.

After leaving the field: data management

The field site coordinator was responsible for uploading data to the project's secure network drive within 24 hours and handing off to the quantitative data manager. Program-specific tracking sheets were used to monitor the flow of data. By cross-checking data uploaded to the network drive with the tracking sheets and Name/ID list, the data manager could determine whether any questionnaires were missing (e.g., because they had not been downloaded or transferred to the network drive). The data manager also made sure that each participant was accurately identified in the data file by cross-checking downloaded ACASI files against the annotated Name/ID list. If individual questionnaire files were not clearly identified by participant ID numbers (e.g., ID was entered incorrectly or left blank), identity check items (e.g., date of birth, gender) were critical to accurate identification of participants.

The tracking sheets also allowed the data manager to monitor paper questionnaires, which were used in cases of computer failure (which rarely occurred), when an unexpectedly large number of youth attended a session (which happened occasionally), to follow up with program dropouts (e.g., via mail), or – most commonly – when youth missed a scheduled ACASI session. Given the logistics of conducting data collection at multiple programs, it was not feasible to have staff take laptops to individual participants who missed scheduled data collection sessions; instead, paper questionnaires were left at the program for these youth to complete. Paper questionnaires were entered into the ACASI program by research assistants, who found this easier than entering data into SPSS.

Once all questionnaire data were accounted for, the quantitative data manager merged the ACASI files and created a master dataset for each time point. From our perspective as researchers, data collection using ACASI offered many benefits, including efficiencies gained on data entry and checking. We turn next to an examination of how youth felt about the process.

Youth reactions to ACASI in the Pathways Project

At the fourth (final) data collection point, youth completed a set of structured and open-ended questions relating to their experience with ACASI. A full analysis of these questions is beyond the scope of the current paper, but for descriptive purposes we provide information on overall reactions to the data collection process. Data were provided by 265 youth aged 12–20 (M age = 16.22). The sample was varied in terms of gender (59.1% female), nativity (88.9% U.S. born) and ethnicity (36.4% Latino, 28.7% African American, 28.7% European American, and 6.1% "Other"). Youth rated how they felt about completing the questionnaire on the computer from 1 (*Strongly Dislike*) to 5 (*Strongly Like*), with 3 being neutral (*Neither Like nor Dislike*). The average rating was 3.79 ($SD = 0.98$), indicating overall positive perceptions. Analyses of variations due to respondent characteristics revealed only one significant difference. African American youth ($M = 4.10$, $SD = 0.97$) had more favorable perceptions than Latinos ($M = 3.64$, $SD = 1.0$) and European Americans ($M = 3.70$, $SD = 0.92$), $F(2, 234) = 5.00$, $p < .01$. There were no differences attributable to age, gender, or nativity.

Youth were asked two open-ended questions about what they liked most and least about completing the survey on the computer. Youth reported favorable perceptions of the computer itself (speed and ease of typing), the audio component (having someone read the questions), and the privacy afforded by ACASI. Typical responses were: "I don't need to write. I can just use the keyboard"; "It is easier that it is on the computer than on paper it takes less [time]. Liked that it was reading the questions for me"; and "I also liked that no one else had to see it." In contrast, some youth disliked having the questions read to them because they felt it slowed the pace of the survey (e.g., "I didn't like having to wait for the computer to read the questions, I'd rather read them myself"). Consistent with the quantitative data, positive impressions predominated over negative ones, indicating overall favorable reactions to the ACASI.

Conclusions and recommendations

Computer-assisted data collection is increasingly used by researchers in multiple disciplines, and may be particularly appropriate for studies of adolescents who grew up as "native speakers" of technology (Prensky, 2006). However, the complexities of implementing computer-assisted data collection may deter developmental researchers from taking advantage of the opportunities technology offers. Although we found that using ACASI required additional work at the start of the project, we believe that it paid off during the study in youth's motivation and speed of work, data quality, and reduced data processing time – benefits that have been identified in methodological studies (e.g., Bobula et al., 2004; Watson et al., 2001). We decided to use ACASI based largely on concerns related to respondent burden, potential reading difficulties, and the large number of questionnaires to be collected; however, cost is undoubtedly an important factor to consider. Brown et al. (2008) developed theoretical models that allow researchers to evaluate the cost effectiveness of computer-assisted data collection

for their particular situation. In concluding, we draw on lessons learned to offer a set of key recommendations at each stage of the research process. These recommendations are summarized in Table 2, which also incorporates other suggestions discussed throughout the paper.

There are multiple issues to consider before going into the field (see also de Leeuw et al., 2003). Two linked tasks are the selection of a data collection device and program. New devices are continually emerging, including smart phones, tablet computers, on-line platforms, and the availability of cloud storage (e.g., Galvez et al., 2009; Lefever et al., 2007; Wilcox et al., 2012). If physical devices are selected, we recommend budgeting funds for maintenance and replacement over the course of the study. Aside from cost, it is important to consider memory and processing constraints, peripherals (e.g., headphones, data entry mode), transportation and storage, and (if applicable) internet capability. With respect to selecting a specific program, Shaw et al. (2011) identified criteria for assessing computer-assisted data collection programs, including design issues, field performance, data handling, and output options.

During the programming stage, researchers must balance the need for maintaining comparability between the ACASI and paper versions of the questionnaire with ensuring a positive user experience and following recommendations regarding best practices for computerized survey design (e.g., Austin et al., 2008; Baatard, 2012; NIMH, 2008; Tourangeau et al., 2013). In longitudinal studies, we recommend the inclusion of identity check questions (vs. relying solely on participant ID) and creation of a single version of the questionnaire (vs. different versions for various time points). Meticulous attention should be devoted to ensuring that the questionnaire is programmed correctly and data are accurately captured.

At the same time as the ACASI is being programmed, field staff and research partners should be prepared for the implementation process. We found it extremely helpful to develop detailed written protocols for various aspects of the study. We provided extensive training for research staff, who were selected to reflect the age and diversity of our multiethnic sample.

Table 2
Recommendations for implementing computer-assisted data collection across the research process.

Before going into the field: preparation	In the field: data collection	After leaving the field: data management
Selecting and preparing the data collection tool • Select a data collection device, considering cost (including maintenance and replacement); ease of use; storage and transportation; hardware and memory needs; peripherals; and other technical specifications (e.g., internet access). • Select data collection program, considering issues of design; field performance; data handling; and output options. • When programming the questionnaire, balance need to maximize comparability between electronic and paper version with recommendations regarding best practices for computerized survey design. • Include identity check questions such as initials or date of birth (in case of incorrect ID entry). • Avoid having multiple versions of the questionnaire in longitudinal studies; if multiple versions exist, develop system to protect from administering incorrect version. • Include indicator variable to allow future analyses of questionnaires completed on computer vs. paper. • Pilot test to ensure instructions, questions and responses are identical to paper version; skip patterns are programmed correctly; data are captured correctly; and (for ACASI) audio and visual components are in sync. ***Preparing for implementation*** • Create detailed protocols for different aspects of research process, including how to handle problems/contingencies. • Select research staff who share important demographic characteristics with participants and can build rapport. • Develop system for identifying eligible participants.	• Coordinate with program contact, tailoring implementation to the program's needs and capacity. • Before each data collection session, review protocols and site-specific plans with team members. • Assign staff member to check equipment (e.g., charge batteries, update questionnaires). • Pre-assign roles to each team member with specific responsibilities (see Table 1). • Consider ideal staff-participant ratio (higher in early stages of data collection). • Number the devices and record which participant used each device on a master list. • Have paper and pencil questionnaires in case of computer failure. • Backup completed data before leaving the site.	• Promptly upload data to secure location (e.g., network server). • Establish a formal process for "handing off" data between field staff and data manager. • Use online data tracking sheet to monitor flow of data (especially important for studies with multiple time points/multiple field sites). • Check for accurate participant identifications in data files, so that questions can be promptly resolved. • Enter paper and pencil questionnaires into program. • Once all data files have been accounted for, create merged data set.

Once in the field, another set of considerations arise. Close coordination with program staff regarding details of field implementation can help avoid confusion during data collection sessions. Particularly early on, researchers should not underestimate the amount of time needed to set up for group data collections or the number of staff required to conduct data collection sessions. Pre-assigning roles to individual staff members can ensure that large-scale data collection goes smoothly.

Finally, after leaving the field site, issues of data management must be considered. Specifics will vary based on the particular device and program utilized. In our study, data were backed up onto flash drives and then uploaded to a secure server, but the growing availability of internet access will likely allow future researchers to upload data automatically to a secure server. Regardless of mode of data transfer, in large or multi-site studies it is easy for data (whether paper or electronic) to be misplaced or lost. Because of this, we recommend establishing a rigorous process for checking in and tracking data.

In closing, we emphasize that the procedures and recommendations in this article are intended to be illustrative rather than prescriptive. Each study poses unique challenges; however, researchers are likely to encounter a core set of decisions and issues as they implement computer-assisted data collection in group settings. It is worth noting that many of the issues we describe would pertain to any type of-computer-assisted data collection (e.g., selecting a data collection device and program, programming the questionnaire) or to paper and pencil data collections with groups of adolescents (e.g., logistics of survey administration). Because of this, our paper has the potential to contribute to the broader methodological literature. It is our hope that future researchers can benefit from our experiences as they consider integrating technology into their study.

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