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How to Accommodate Women With Mobility Limitations in Biological Studies

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Abstract

People with disabilities should be routinely included in research studies if there is no specific reason for their exclusion. Regardless, they may be inadvertently excluded because of the procedures of the study. By conducting a community-based biological study with women aging with mobility limitations, these authors gained further understanding of their accommodation needs during research participation. The women aging with mobility limitations offered specific physical, cultural, or environmental needs that could have influenced the methods, procedures, and possible outcomes involved when conducting a biological study with this community living population. The authors and participants identified methodological challenges for women with mobility impairments within three key areas: recruitment procedures, laboratory procedures, and community-based data collection. The authors propose possible solutions to these identified challenges. It is our hope that this will begin a larger dialogue on how to routinely accommodate people with disabilities in biological research studies.

Keywords

biological; older women; mobility limitations; disability; research design

Inclusion of biological data in gerontological research can provide valuable information that may improve quality of life and possibly prolong life in our aging population (Thompson & Voss, 2009); however, there may be challenges when collecting community-based biological data in older women with mobility limitations. According to long-time women's health expert and disability activist Nosek (2000), women with mobility limitations are at risk for being excluded from these types of studies because they may complicate research designs because of their comorbid conditions and their atypical functional abilities (Nosek, 2000). Biological data collection procedures may need to be tailored to meet the needs of the women thereby increasing the time spent designing and conducting the study; hence, this population of women may be inadvertently excluded from studies. More recently researchers have begun to include adults with mobility limitations in their studies; however, these studies are primarily aimed directly at people with disabilities or at specific diagnoses. There is still a need for general studies of health outcomes that include this population as part of the

larger sample. To facilitate this, researchers need to be aware of what to expect and how to overcome anticipated challenges.

It is essential that nurse researchers examine biological data in groups such as older women with mobility limitations because it can provide further knowledge on disability and health outcomes in late life (Harrison, 2009; Kang, Rice, Park, Turner-Henson, & Downs, 2010; Whitfield, Angel, & Wong, 2011) that can be essential for the development of appropriate health care treatments and interventions (Nosek, 2000). For example, understanding cortisol levels and stress may reveal information about the daily life of older adults with mobility limitations (Kalpakjian, Farrell, Albright, Chiodo, & Young, 2009) and examining the lengths of telomeres may provide information on disability risk (Risques et al., 2010). Biological data in older women with mobility limitations may provide the needed knowledge to improve physical function, social engagement, and healthy aging in this population (Manolio, 2007).

To include older women with mobility limitations in biological research, the research methods and study procedures needed for this population should be clear. These women have unique needs that are important to anticipate before collecting biological data in the community. For instance, the women may experience fatigue (Harrison & Stuifbergen, 2001), pain (Harrison, 2009), and have limited dexterity (Crentsil, Ricks, Xue, & Fried, 2010; Feeny et al., 2012) that may present difficulties when collecting biological samples. Hence, within the context of a pilot study designed to investigate the relationships between biological influences (telomere length, cortisol, and C-reactive protein [CRP]) and psychosocial influences (pain, depression) on perceptions of disablement (impairment, function and disability) in women aging with mobility limitations, the authors sought to evaluate the need for accommodations when recruiting and conducting biological research.

BACKGROUND

Although researchers have included adults with mobility limitations in their community-based biological research studies, few have described how they collected their community-based biological data in older adults with mobility limitations.

Kalpakjian and colleagues (2009) examined the relationship between salivary cortisol and stress in community-dwelling adults with spinal cord injuries. The researchers explained that the study materials used to collect biological data were designed to eliminate or minimize environmental barriers that may have been encountered in the field by participants with spinal cord injuries but were not specific about those (Kalpakjian et al., 2009). Risques and colleagues (2010) examined the relationship of telomere lengths to activities of daily living in a community-dwelling population of 624 adults older than 65 years of age with disabilities and explained their lab analyses procedures, but they did not specify how they conducted community-based biological data collection in this population (Risques et al., 2010).

Other researchers have conducted biological-based studies with samples of adults with mobility limitations in clinical settings. Salvisberg and colleagues (2014) conducted their

biological data collection in people with multiple sclerosis in a clinical setting. Okifuji, Bradshaw, and Olson (2009) examined the relationship between biomarkers and obesity in 38 adults with fibromyalgia syndrome. The researchers reported that biological data collection took place in a clinic and a functional assessment was conducted in the home. The researchers did state that participants were escorted to phlebotomy services; however, no further information about difficulties or accommodations that they needed to make to collect biological data were reported.

In summary, there is a growing trend of community-based biological research, and it is essential that researchers understand how to incorporate older women with mobility impairments into these research studies. Few researchers have included this population in their community-based biological studies and even fewer researchers have described the necessary study procedures needed to include this population. Before conducting a biological study in this population, it is essential that researchers first understand the unique needs within older women with mobility limitations. If such accommodations or needs are not addressed, this may influence the validity and/or outcomes of the study.

Researchers have identified the specific needs of adults with mobility limitations within health care settings (Kirschner, Breslin, & Iezzoni, 2007; Pharr & Chino, 2013); however, there is a dearth of literature on the specific needs of older women with mobility limitations when collecting biological data within community settings. In this article, it is our purpose to identify methodological challenges within the following areas: recruitment procedures, lab procedures/requirements, and community-based data collection and provide suggestions for accommodations that can be worked into the design of the study. To accomplish this purpose, we will review the context of the current pilot study where the challenges were identified by the research team, including the participants. This will allow other researchers to compare their designs to this design to evaluate the level of similarity or difference. Next, we will discuss the actual laboratory procedures used that resulted in various levels of need among the women.

Lastly, we will propose possible solutions to address the identified challenges.

RESEARCH DESIGN AND METHODS

A cross-sectional nonexperimental research design was used for the pilot study examining the relationship between biological and psychological influences and the disablement outcomes of older women with mobility limitations. Approval was obtained from the University of Texas at Austin Institutional Review Board and Environmental Health and Safety department. Women were recruited through community liaisons and fliers as well as a database of women interested in future studies. If the women stated they were interested in the study, they were screened for inclusion based on age, gender, and disability status. If the women met inclusion criteria, an appointment to collect data was scheduled at locations convenient to both the women and the researcher. During the appointment, 10 mL of blood were collected for telomere lengths, 10 mL of blood were collected for CRP levels, and 5 mL of blood were collected for cortisol levels. Two separate tubes of saliva were obtained (4 mL in each tube) for cortisol levels at least 30 min apart. A survey booklet consisting of

demographic and health profiles and a battery of instruments were administered. The five instruments were standard and reliable measures of activity effort, depression, disability, function, and comorbidity.

Sample

There were 28 women who completed the study. The demographic background of the women is reported in Table 1. The mean age of the sample was 66 years. The most common reason for their limitations was arthritis. The women had various other comorbidities including post-polio syndrome, hypertension, diabetes, kidney damage, and congestive heart failure.

Recruitment Procedures

Recruitment for the study began with research personnel distributing fliers to various senior activity centers within the central Texas region. Approximately 10 of the participants were recruited directly through senior activity centers. The remaining participants were recruited through a community liaison ($n = 4$), by word of mouth from other participants ($n = 10$), or by direct mailing to participants who had participated in a previous study and stated they would be interested in future studies ($n = 4$).

There were 41 women and 1 African American man who contacted the research office to state they were interested in the study. The first author (JW) screened the participants for inclusion; 32 qualified for the study; however, the sample size was limited to 28 women for this pilot study.

There were 22 non-Hispanic White (NHW) women and 6 Mexican American (MA) women included in the pilot study. There were two women who contacted the office but declined to participate. The two women who declined stated it was primarily because of the collection of biological data. One stated, "Taking my blood is a pretty big deal, I would be more comfortable with an interview."

The principal investigator (TH) of the study accompanied the first author (JW) during the data collection for the first two participants. This training was necessary to ensure adequate procedural knowledge and skill, to encourage problem solving related to unanticipated events with women with mobility limitations, and to foster a team approach to the research. The second author (MT) observed three data collection sessions at two locations with the first author (JW) as well. The first author (JW) then collected data for the remainder of the study alone. This contributed to consistency in measurement, greater participant trust, and enhanced participant recruitment.

Trust had to be established and maintained during the study for snowball sampling to occur. For example, one participant wanted to recommend her sister for the study; however, her sister was undecided if she wanted to participate. The participant invited her sister to meet the first author (JW) and watch the data collection procedure. The participant's sister stated she felt "comfortable with the research nurse and the way she did things." In addition, the participant stated, "I trusted her in my home, you can trust her too."

Laboratory Procedures/Requirements

The first author (JW) was responsible for the community-based biological data collection, carrying all safety and data collection materials required by the university to every meeting. The materials included are listed in Table 2. The biological specimens were kept in a leak-proof container with a gasket lid, which remained in a cooler and was transported to the biological lab. The university required that all personnel dealing with biological data complete a training course for bloodborne pathogens, laboratory safety, biological safety, and hazardous waste management. The process for consenting and collecting data in the field is outlined in Figure 1.

Community-Based Data Collection

All of the data collection took place in a community location of participants' choice: homes ($n = 24$), community church ($n = 2$), and senior activity center ($n = 2$). When the appointments were conducted in facilities outside the participants' homes, the facilities' directors were contacted to arrange for permission and appropriate accommodations. A private room within each facility was obtained to maintain confidentiality. The rooms included a table and comfortable chair.

Data collection appointments took place in the morning hours between 8 a.m. and 11 a.m., except in the case of two participants; the variation was because of their sleep patterns. These two women preferred to sleep later into the day on a routine basis. Women with mobility limitations may have varying sleep patterns because of pain, attendant availability, and/or positioning problems during sleep. Understanding their cycles was necessary before proceeding with salivary data collection because the results are highly dependent on their natural sleep-wake cycles.

Among the two participants who elected to have their appointments in the afternoon was one participant with an abnormally high cortisol level. We did not identify any medications that influenced her results. Her cortisol levels may have been altered because of the time of day of collection, abnormal sleep hours, or caused by a physiological condition. The participant was notified of the high level and was encouraged to follow up with her health care provider.

The sequencing of data collection using biological measures and survey instrument data was timed to ensure valid and accurate measurement of both types of data. Community-based data collection was used for this study to minimize participant burden (Buck Louis et al., 2011) because of the high level of transportation barriers experienced by women with disabilities. The amount of time to complete the study was estimated to be 60 min. However, in working with women with mobility limitations, extra time was allowed for assistance with mobility needs and any other event that might have occurred. For instance, one participant had a home care assistant scheduled only in the mornings. She had to complete her hygiene activities with her assistant before data collection could begin. Another example is the need to remain close to participants after data collection to ensure their return to typical functioning. Hence, upon completion of the appointment, the data collector remained with the women to ensure that the women were not dizzy or at risk for injury or falls. These time-related factors were considered when planning the study and explained to the data collector.

If working with a data collector who is more accustomed to clinic or hospital settings, where people are often held to strict standard appointment times or schedules, providing time accommodations and assessments may need to be explained.

The steps for collecting saliva samples were as follows. The participants were asked not to eat or drink anything besides water 2 hr prior to the data collection appointment time. This was confirmed prior to data collection. The participants were asked to allow saliva to pool in their mouths and then allow it to drain into a specimen tube. The saliva samples were collected at least 15 min apart. Participants were given the option to use a straw to guide their saliva into the specimen tubes.

There were three participants who demonstrated difficulty using the specimen tubes for saliva collection. The tubes were 17 × 20 mm, 15-mL tubes, manufactured by Becton Dickinson. More specifically, the women had difficulty coordinating their hand-to-mouth movement, so that they were unable to maneuver the tubes to their lips in a manner that allowed them to capture saliva. One participant stated, “The tube was difficult to hold.” To accommodate this issue, the tube was held for the participant during saliva collection. For one participant who was visually impaired, the tube placement was a challenge because she could not see exactly where she needed to place it. For two other participants, the women stated the tube was “very small” and expressed difficulty getting saliva into tube openings.

The data collection nurse observed a diverse number of responses when participants were asked to provide the first sample of saliva. There were eight NHW women in the sample who voiced concern about the process for data collection. For example, one NHW participant stated, “This is the weirdest thing I have ever done, spitting.” A second participant explained that this was not a process that a lady from the South should be doing, and another NHW participant stated, “This is not going to be attractive but I will try it.” Three of the NHW participants felt uncomfortable providing the sample in front of another person and elected to provide it alone in a bathroom. The MA women who made comments referred to the difficulty in producing saliva. For example, one MA woman stated, “My mouth is so dry since I became a diabetic,” and a second participant commented, “This is hard.”

For this particular pilot study, we found that NHW women were concerned with how the act of spitting would look and feel, whereas the MA women expressed concern only about the difficulty in performing the task. The act of spitting or drooling can have different meanings across different cultures (Bhowmick & Raha, 1996). We found in this study that culture may have influenced the women’s perception of providing sputum into the tubes. Indeed, the collection of saliva was more difficult for participants and garnered more negative comments than the collection of blood.

Use of medications presented difficulty in collecting the biological data as well. The women with mobility limitations reported trouble secreting saliva because of medication side effects. For example, two medications reported to cause these problems were Lyrica and Cymbalta. Two women stated that their medications caused dry mouth, which made it difficult to produce saliva. One participant took 45 min to provide 4 mL of saliva.

This lengthened the time spent collecting data to more than 2.5 hr, which took 1.5 hr on average. Participants were encouraged to rinse their mouths with water to help with salivation. In addition, two women explained they did not take their pain medications on the day of the study because it needed to be taken with food and water. Given they were fasting; they did not take their medications, which made it more difficult than usual to focus on completing the study tasks including completing the survey.

Venipuncture was performed to obtain blood samples after obtaining the saliva samples and the completion of the written questionnaires. There were challenges to venipuncture in three of the women. One difficulty was gaining access to veins while assisting the participants to reposition themselves. Many of the women had edematous or obese arms that had been accessed multiple times in the past. If the participants were unable to transfer themselves or change positions, it was difficult to stop to assist them while gaining access to their seemingly hidden veins using the required techniques. In spite of the difficulties, venipuncture was successful in 27 participants. Having a second set of skillful hands for assistance with mobility and repositioning would have been helpful for this population. Venipuncture was made easier by listening to the insights learned from the women who had been exposed to venipuncture for various reasons multiple times over the years.

DISCUSSION

It was our purpose to share many of the issues that may arise when working with women with mobility limitations during community data collection. From our experience conducting this pilot study, there are methodological issues and challenges that are unique to data collection with women aging with mobility limitations. Based on these findings, we recommend possible solutions for other researchers. A full list of the specific challenges and recommendations are presented in Table 3. For instance, women who did not take their pain medications because of our fasting requirements began to feel pain during the data collection appointment, which if left unaddressed could have skewed the actual data from their normal results. We encouraged participants to take their pain medications and built this into our instructions, and we recommend researchers advise their participants to take medications before the appointment if possible. At the very least, it is important to assess their level of pain during data collection and document if it shifted because of the procedures of the study.

A second major issue found during this pilot study was the difficulties reported by women during the collection of saliva samples. First, providing saliva samples might be foreign to some participants. It is important that researchers take into account culture, age, gender, and physical factors that may influence older women's understanding and perception of providing saliva for a research study before asking that population to perform the desired task. Researchers have reported that collecting saliva through passive drool offers many benefits such as (a) ability to collect large sample volume in a small amount of time (3–5 min), (b) target collection volume may be confirmed by visual inspection, (c) the fluid collected is a mixture of saliva from all the salivary glands, (d) collection materials are less expensive than alternative formats, and (e) there is less of a threat to the validity of the study than with oral swabs (Granger, Johnson, Szanton, Out, & Schumann, 2012). Regardless of the method chosen when collecting saliva in the community with older women with mobility

limitations, it is essential to (a) be consistent in usage of collection materials, (b) use standardized methods that promote adherence and understanding and decrease participant burden, (c) have procedures in place to control for confounding agents such as nicotine/caffeine use or medications (Hodgson & Granger, 2013), and (d) determine the appropriate time of day to collect samples (Woods & Menten, 2011). Despite the benefits of collecting saliva via passive drool, it is essential to note the women's concerns. One accommodation may be to provide privacy for participants providing saliva samples and to use other alternatives if necessary, such as swabs or other absorbent devices.

The second problem with saliva data collection was reported by women who had difficulty secreting saliva because of dry mouth/side effects from medications. When collecting both biological data from older women, it is also essential to get a thorough history from them. It is recommended to obtain an accurate list of medications taken in the last 48 hr, this will alert the researchers to any medications that may influence salivary production or results (Granger et al., 2012). Women aging with mobility limitations may have comorbidities; and therefore, may be on several medications that may influence the results of various analyses, not just cortisol. We recommend allowing women to take sips of water and/or use salivary stimulants, such as a sugar-free citrus candy.

The third problem was related to the women's ability to hold small tubes or other data collection tools needed for the collection of saliva specimens. Small collection devices that require a great deal of dexterity may present problems when collecting samples in women with mobility or functional limitations (Woods & Menten, 2011). We recommend that if saliva specimens are collected by passive drool that the data collector be prepared to hold the tube for the women or the tube should be placed in a holder or wrack on a table at chest height, while directing the women to drool over and into the tube. In addition, researchers should consider having personnel available to assist older women with mobility and/or functional limitations in collecting saliva when the tubes are small. When women with disabilities have multiple limitations, it may be wise to send two data collectors to assist the women with data collection, making sure they are trained in the assistance of people with disabilities. Researchers can also consider having the participants collect saliva in a sterile cup that research personnel could transfer to designated tubes using pipettes (Woods & Menten, 2011).

The third major issue was related to venipuncture with women with challenging anatomy; there were difficulties associated with venipuncture because of the buildup of scar tissue in arms, which made it difficult to access veins. We recommend allowing for extra time to prepare for a venipuncture. Applying warm packs and/or gravity to arms before performing venipunctures is recommended for efficiency in collecting blood samples successfully. Data collectors need to be trained to find veins based on touch. It is essential that all research personnel collecting data should have adequate training and experience (McKenna & Niles, 1995), specifically with people with chronic and disabling conditions. In addition, a lack of range of motion in arms often made it difficult to position participants' arms to see their anatomy. We recommend repositioning women on a bed or couch if possible and/or using sliding boards to assist with moving the women. In the case when venipuncture was not successful, referring participants to a laboratory for venipuncture is an option if research

personnel are not able to obtain blood specimens in the home. This may result in the loss of participants with mobility limitations within the study because a trip to an outpatient laboratory may be too difficult for a person with mobility limitations. A lack of accommodating modes of transportation can also be a barrier to fulfilling a laboratory referral (McKenna & Niles, 1995). Researchers may want to consider the use of taxi services that can provide appropriate accommodations or use laboratories that can perform at home data collection services if participants are unable to get transportation to an alternative site or laboratory for data collection. Having a second data collector may also be an option if the data collector is unsuccessful in obtaining blood samples.

Another major issue was related to the assumption that people sleep and wake to a very similar day–night pattern, but this is not the case for many women with mobility limitations, especially if they are not employed. The women may have had different routines that made scheduling and collecting data specific to their circadian rhythms. We recommend maintaining scheduling flexibility so as to reflect the wake–sleep routines of the women. In addition, researchers should maintain scheduling flexibility because the women may experience unpredictable exacerbations of their conditions or a loss of their attendants unexpectedly that may prohibit completing their data collection appointments. It is important that researchers never insist on continuing with data collection if this occurs. Exacerbations of conditions could also interfere with the biological data values being collected, and appointment can be rescheduled.

CONCLUSION

If there is not a solid methodological reason for excluding men and women with disabilities from a study, they should be included. Regardless, they can be inadvertently excluded because of the procedures of the study if they do not provide the necessary accommodations. We provided our experience with women with mobility limitations to start a conversation on the ways in which procedures can be altered to ensure their participation. Further, researchers expert in their populations should begin to share their expertise with the inclusion of people with mental health limitations and other types of physical conditions, so that those populations are also routinely included in studies.

Biological research can provide further understanding of health (Kang et al., 2010) and disability outcomes in older women; however, collecting biological data from women aging with mobility limitations may present challenges. In this study, cultural factors, medications, mobility, and health factors affected the participants' ability to provide saliva and blood samples. This also affected the estimated time needed to participate in the study. Participants may also have visual, hearing, dexterity, and mobility issues that influence their ability to complete documents, hold tubes, and manage multiple questionnaires. Asking these participants questions related to accommodation needs prior to the data collection appointment is essential regardless of the population assumed to be participating in the study.

It is important that researchers choose the appropriate saliva and blood collection procedures and storage and transport of samples to not only accommodate the special issues and needs

of those aging with mobility limitations but also increase the validity of the study (Granger et al., 2012; McKenna & Niles, 1995). This work also applies to international research, which may be more relevant to those countries less accustomed to providing accommodations to people with disabilities. In addition, it is essential for researchers to maintain valid and reliable biological studies because these studies may provide critical knowledge for the development of interventions, which may improve health outcomes and quality of life in older women with and without mobility limitations.

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Figure 1.
Process of biobehavioral mixed method data collection.

TABLE 1.

Sample Demographics

	%	<i>M (SD)</i>
Age (years)		65.57 (5.80)
Years of education		
Elementary	7.1	
High school	35.7	
Some college	17.9	
Associate's degree	10.7	
Bachelor's degree	25.0	
Master's degree	3.6	
Marital status		
Married	25.0	
Divorced	43.0	
Widowed	25.0	
Living with significant other	3.6	
Income/per year		
Less than \$10,000	36.0	
\$10,000–\$15,000	7.1	
\$15,000–\$20,000	14.0	
\$20,000–\$25,000	14.0	
\$25,000–\$35,000	17.9	
\$35,000–\$50,000	7.1	
\$50,000–\$75,000	3.6	

TABLE 2.**Materials Needed for Biological Data**

Required Items Included in Transport Container	Optional Items Included in Transport Container
Eye wash kit	First aid kit
Goggles	Ice packs
Gloves	Absorbent medical pads
Hazardous waste transport bags	Gloves
10% bleach solution	
Antibacterial soap	
Sharps container	
Leak-proof box with gasket-sealed lid	
Cooler	

TABLE 3.

Barriers to Community-Based Biological Data Collection and Possible Accommodations for Women With Mobility Limitations

Barriers to Collecting Biological Data from Women With Disabilities	Possible Accommodations
Pain as a barrier	
<ul style="list-style-type: none"> • Pain may interfere with activities of data collection. 	<p>Do venipuncture at the end of the data collection so they are not asked to do activities after a blood draw. It should be the final activity.</p> <p>Tell participants to take their regular pain medications with a sip of water. Do not withhold pain medications.</p> <p>May add a variable indicating pain medications were given during data collection to the final data set.</p>
Barriers associated with saliva specimen collection	
<ul style="list-style-type: none"> • Reluctance to drool into data collection tubes in public or in front of the data collector. 	<p>Absorbent collection devices (e.g., swabs) may be used as an alternative.</p> <p>May allow the participant to take tube into a private area.</p>
<ul style="list-style-type: none"> • Difficulty secreting saliva because of dry mouth/side effects from medications. 	Use of salivary stimulants (e.g., sugar-free citrus candy) may be used.
<ul style="list-style-type: none"> • Difficulty holding the tube during collection of saliva specimen. 	Place the tube into a holder or wrack on a table at chest height for the women to bend over during the process.
Barriers associated with venipuncture	
<ul style="list-style-type: none"> • Edematous arms with scar tissue interfering with venipuncture. 	Allow extra time to prepare venipuncture site with warm packs and gravity. Investigate best site thoroughly prior to beginning venipuncture. Train skilled data collectors to find veins based on touch.
<ul style="list-style-type: none"> • Positioning of women in wheelchairs for ease of access to veins during venipuncture may be a problem. A lack of range of motion in arms can make it difficult to position their arms to see their anatomy. 	Ask the individual where blood is usually collected and how. Allow extra room around the wheelchair so the person doing the venipuncture has ample space. Never force movement of joints or extremities. If possible, reposition the woman onto a bed or couch. Sliding boards may be used to assist with moving the woman to and fro.
<ul style="list-style-type: none"> • The data collector may not be able to perform venipuncture. 	Depending on the study design, the data collection can be rescheduled for another time. May need to have a second data collector on-call for difficult situations where expertise is needed. May also need to build into the design and recruitment that there may be missing data.
<ul style="list-style-type: none"> • May not have transportation to an alternative site for data collection or to a laboratory for data collection. 	May need to arrange for taxi service that provides accommodations. May contract with a laboratory that provides home data collection services.
<ul style="list-style-type: none"> • Some women have had contraindications to venipuncture in specific arms. 	Always ask the women if they have any contraindications before proceeding.

Barriers to Collecting Biological Data from Women With Disabilities	Possible Accommodations
Barriers associated with postvenipuncture care	
<ul style="list-style-type: none"> The women may experience lightheadedness after a blood draw. 	<p>May need to bring and offer the women water or orange juice in the event it is needed. Stay with the women until resolved. Seek assistance if prolonged or becomes a fall risk.</p>
<ul style="list-style-type: none"> The women may not be able to maintain pressure over a venipuncture site because of weakness in hands. 	<p>Train data collectors to hold pressure to the site and follow up with gauze and tape over the site. Never leave the participant without rechecking the status of the site, along with instructions to gain assistance in the event of a problem.</p>
Barriers associated with data collection appointment	
<ul style="list-style-type: none"> The women may have diminished memory, which may affect ability to remember scheduled appointments and/or instructions. 	<p>Provide reminders about the appointment the day before it is scheduled; include any specific data collection instructions. These may need to be repeated. Provide a mailed appointment card with instructions when possible.</p>
<ul style="list-style-type: none"> Women do not always conform to the researchers' schedule. They may have different routines that make scheduling and collecting data specific to their circadian rhythms more challenging. 	<p>Maintain flexibility of data collectors' schedule so to reflect the wake-sleep routine of the women.</p>
<ul style="list-style-type: none"> Women may have an unpredictable exacerbation of their condition that prevents them from completing appointments. 	<p>Maintain flexibility of scheduling. Never insist on data collection. Consider if the exacerbation would interfere with the biomarkers or laboratory values being collected.</p>
<ul style="list-style-type: none"> Women may have a cancellation from their attendant who does their morning hygiene. 	<p>Rescheduling on a short notice is often necessary. Give the women a cell phone number for contact with the data collector in the event of cancellations.</p>
Physical limitations barriers associated with completion of paper work	
<ul style="list-style-type: none"> Hand dexterity may be an issue for women trying to complete paper work. 	<p>May need to offer to complete the paper work for the individual. Large diameter pens can be offered.</p>