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Engaging Undergraduate Kinesiology Students in Clinically-Based Research

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Abstract

Many undergraduate students in kinesiology are interested in clinical careers and seek research opportunities for advanced study and unique learning experiences. This paper describes a process of engaging undergraduate students in a multi-disciplinary, NIH-funded Program Project investigating factors that may affect pelvic floor support and symptoms in primiparous women during the first year postpartum. Students complete general and protocol-specific training prior to engagement, have specific tasks that reinforce skill development and require independence, and are invited to participate in additional opportunities with the investigative team. The topic of pelvic floor health is novel to most students and participation in this research expands their knowledge beyond a mainstream kinesiology curriculum. Institutionalizing this type of program could formalize undergraduate student research experiences and facilitate ongoing clinical research efforts with a kinesiology focus.

Keywords

undergraduate research; clinical research; physical activity; pelvic floor

Introduction

Engaging undergraduate students in research affords students diverse and practical learning experiences that complement classroom approaches to education in a variety of disciplines (Lopatto, 2004). The National Science Foundation spearheaded the incorporation of research into undergraduate curricula, and funds such programs in traditional areas of science, technology, engineering and math (STEM)(National Science Foundation, 2004). Further, the National Institutes of Health offers research training opportunities and scholarships to undergraduate students (U.S. Department of Health and Human Services, National Institutes of Health, & Office of Extramural Research, 2016, July 18). While research was once

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considered the hallmark of graduate education, programs directed toward undergraduate research are now common on university campuses.

Many undergraduate students in kinesiology aspire to advanced clinical study in medicine, physician assistant programs, physical and occupational therapy, dentistry and nursing (Thomas, 2014). Medicine and many allied health graduate programs require research experience for admission, creating a need for research opportunities appropriate to undergraduate students. Beyond graduate school prerequisites, participating in community-based research positively impacts professional growth, educational experiences and civic engagement (George, Wood-Kanupka, & Oriel, 2017).

When exploring options for research experience, students typically work with established investigators on an existing project that may or may not relate to their area(s) of interest. Often, this experience may be limited to data extraction with no personal contact with participants. Some topics in kinesiology, such as those that focus on athlete performance, may not translate well to more clinically focused students. Lastly, with so many post-baccalaureate students migrating to clinical areas, engaging undergraduate students in research may be a prime opportunity to carry forward research methods unique to kinesiology.

Faculty engaged in funded research, on the other hand, face the reality of limited and shrinking budgets, which can threaten capacity and ultimately research quality. Engaging undergraduate students in clinical research can extend the reach of investigators and other study staff, especially when sustained efforts are required to retain participants over time. The observed increases in undergraduate students studying kinesiology can provide additional person power to the research effort in this regard (Thomas, 2014). For these efforts to improve and not detract from research quality and efficiency, they must be well-orchestrated and driven by procedural controls. Engaging undergraduate students in research should also provide learning opportunities that extend beyond the tasks students provide the research team.

The aim of this report is to describe the development and coordination of a student volunteer program in kinesiology to improve research team capacity and quality, while offering students a unique educational experience. Described herein are the methodology of training and providing oversight of student volunteers, the development of manuals of operation to guide study procedures, and additional educational components offered to students about the central theme of the particular research program, physical activity and pelvic floor health.

The Clinical Area: Pelvic Floor Health and Physical Activity

Study of the pelvic floor is not typical in the field of Kinesiology, yet physical activity and exercise are thought to play a role in both the prevention and pathogenesis of pelvic floor disorders, such as urinary incontinence and pelvic organ prolapse (Nygaard & Shaw, 2016). Much of the research on physical activity and pelvic floor health has been conducted by clinician scientists and is largely focused on pelvic floor muscle exercises to reduce urinary incontinence (Dumoulin, Hay-Smith, Habée-Séguin, & Mercier, 2015). While the study of physical activity during pregnancy is well established in kinesiology, physical activity and

exercise guidelines for the postpartum woman are general, focus mostly on weight loss and postpartum depression, and do not specifically consider health of the pelvic floor (Harrison, Brown, Hayman, Moran, & Redman, 2016; Mudd, Owe, Mottola, & Pivarnik, 2013). This area deserves the attention of exercise specialists given the high prevalence of pelvic floor disorders in women and the potential role of physical activity in preventing or promoting these disorders. Specifically, one in four women in the U.S. has moderate to severe symptoms of at least one pelvic floor disorder, and up to one in five women in the U.S. will have a surgery for a pelvic floor disorder in her lifetime (Nygaard et al., 2008; Wu, Matthews, Conover, Pate, & Jonsson Funk, 2014). Some clinicians recommend that women avoid strenuous and repetitive impact activity as a means of preventing these conditions (American Urogynecologic Society, 2017; WebMD, 2017). These recommendations are in contrast to the popularity of strenuous training programs and in the reported health benefits of sporting activities afforded girls and women since Title IX legislation in 1972 (Kaestner & Xu, 2007; Knapik, 2015). Pelvic floor disorders have potentially devastating impact on women's lives and discovering preventive, controllable risk factors, including physical activity and exercise behaviors, is of interest to this research team.

There is an increasing body of evidence that supports a genetic predisposition to both pelvic organ prolapse and urinary incontinence (Richter et al., 2015; Ward et al., 2014). To date, vaginal delivery is the strongest non-genetic risk factor for the development of pelvic floor disorders, in particular pelvic organ prolapse (Hallock & Handa, 2016). During vaginal delivery, the pubococcygeus muscle is stretched more than three-fold its original length; not surprisingly, this muscle evulses from its attachment in about 15% of women during first vaginal birth (Lien, Mooney, DeLancey, & Ashton-Miller, 2004; Schwertner-Tiepelmann, Thakar, Sultan, & Tunn, 2012). Additional injuries during childbirth include damage to nerves, connective tissue, bone and other pelvic structures (Miller et al., 2015). Despite the need for recovery from damage to connective tissues and muscle, specific recommendations for the timing of return to pre-pregnancy levels of activity in the early postpartum period for the purpose of pelvic floor health have not been established. Even less well understood are specific recommendations for the frequency, intensity, time and type of activity for women recovering from vaginal delivery. Therefore, the need for clarity on postpartum exercise recommendations is apparent. Arguably, this topic is important for undergraduate students in kinesiology.

The Motherhood And Pelvic health (MAP) Study

The impetus for the program described in this paper is a Program Project funded by the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, entitled "Bridging physical and cultural determinants of postpartum pelvic floor support and symptoms following vaginal delivery", abbreviated "Motherhood And Pelvic health (the MAP Study)". The MAP Study aims to investigate physical factors such as intra-abdominal pressure and physical fitness, as well as behaviors such as the amount and timing of physical activity and inactivity, important for postpartum pelvic floor health, as well as the cultural milieu in which women experience pelvic floor changes associated with childbirth (Nygaard et al., 2017). The population is a cohort of women who gave birth to a first child (primiparous) who live within a 60-mile radius of the site of this study and who delivered

vaginally, with overrepresentation of Mexican-American women who may engage in different cultural practices related to postpartum physical activity. The research team consists of investigators in Obstetrics and Gynecology (OB/GYN), Kinesiology, Bioengineering, Family and Preventive Medicine, Nursing, and Biostatistics.

The MAP Study assesses physical activity and inactivity using wrist-worn accelerometers, which seems most appropriate for this postpartum population and is consistent with recent large surveillance studies such as the National Health and Nutrition Examination Survey (Matthews et al., 2016). Physical activity is assessed twice in the early postpartum period, within the 2nd to 3rd week and again within the 5th to 6th week after delivery, and then later at 6 months postpartum. One year postpartum, amongst other measures, hand grip strength, a surrogate for upper body strength, and body composition by BodPod™ are also assessed. Details of the study protocol rationale, aims and hypotheses are described elsewhere (Nygaard et al., 2017).

The Need for Increased Study Team Capacity

Asking first-time mothers to wear an accelerometer presents challenges that the investigative team considered thoroughly. Early postpartum women are often sleep-deprived, which can impact cognitive function (Casey, Huntsdale, Angus, & Janes, 1999). Investigators first planned to mail accelerometers to participants, but became concerned that the device loss rate in early postpartum women would exceed the 5% reported by others (Matthews, Hagströmer, Poher, & Bowles, 2012). Given a priori power analyses, approximately 800 women are expected to complete accelerometry at both 2–3 and 5–6 weeks postpartum, and about 600 at 6 months. A device loss rate of even 5% would create unacceptable burdens on the study budget and would jeopardize research integrity. After deliberation, study investigators concluded that in-person delivery of accelerometers would be most likely to ensure accurate delivery and reduce device loss. Further, in-person distribution of accelerometers allows for instructions to be given just prior to use which would potentially reduce collection of non-wear data that can occur with distribution through the mail (Keadle, Shiroma, Freedson, & Lee, 2014). In a summary of best practices for accelerometry research, Matthews suggests personal delivery of accelerometers to research participants is ideal, but in most cases is not practical (Matthews et al., 2012). Since the personnel budgeted on this project is limited to nominal support for two faculty investigators and half-time support for one graduate research assistant, this task would be impossible to manage without additional help. Given that the budget for the research program did not allow for additional expenses, that the amount budgeted for the original plan of mailing accelerometers was far less than what would be needed for additional personnel, and that several students had inquired about research possibilities, engaging student volunteers was considered.

In addition to personal distribution of devices, the MAP Study protocol requires significant personnel effort for scheduling device distribution and retrieval and ensuring adherence with the study protocol, along with the usual management of the devices themselves. Assessment at 1-year postpartum to obtain final study outcomes requires clinical testing, assessment of body composition and muscular fitness. Undergraduate student volunteers are engaged in all aspects of these processes.

Methods

The MAP Study is approved by the University of Utah Institutional Review Board and all participants provide signed informed consent in either English or Spanish.

Undergraduate students may be reluctant to seek research opportunities without an invitation. The process used herein begins with a faculty member (JMS) providing students in large undergraduate courses a general description of the study, the need for student volunteers, and typical activities student volunteers would do. In addition, undergraduate academic advisors and colleagues are alerted by the PI to the need for student volunteers, who then provide the contact information of the PI to interested students. These students phone or email the PI directly to learn more about opportunities for engagement. Occasionally students learn about volunteer opportunities through word of mouth with students currently engaged in MAP. Student volunteers do not receive incentives such as class credit or bonus points, and their participation is in addition to their standard university requirements.

The steps to initiate students into their role as volunteers are summarized in Table 1. The University of Utah Health Sciences Center houses a centralized program, the Volunteer Program, for those wishing to volunteer in clinical settings. Since students engaged in MAP interact in some way with study participants or their data, these services are employed to begin the training process for undergraduate volunteers. The Volunteer Program provides bi-monthly trainings that include a brief orientation and Health Insurance Portability and Accountability Act (HIPAA) training. The Program conducts criminal background checks on all volunteers and provides vaccinations as needed. Volunteer students must be up to date on a variety of vaccinations, including annual influenza vaccinations. Students then complete on-line training for conducting research with human subjects, as required by the Institutional Review Board, and conflict of interest (COI) training and disclosure. Given recent National Institutes of Health requirements, students also complete Good Clinical Practice training. Once completed, student volunteers are added to the list of key personnel with the Institutional Review Board. Students involved in this project do not complete informed consent with participants. Once they begin, students are asked to track their volunteer hours.

Specific training for study procedures is guided by manuals of operation (MOOs), which are provided in hard copy in laboratory facilities as well as in electronic form in a secure, cloud-based location. The MOOs serve as the standards for duties assigned to students. Student volunteers meet with the principal investigator and/or the graduate research assistant to learn details of accelerometer use, how to complete required paperwork for documenting the data collection process, and the procedures for dropping off and picking up devices to and from participants. For students who personally distribute accelerometers to participants, basic scripts for communicating with participants are provided. These scripts are limited to verbiage for introducing oneself to a participant and arranging a day and time to give the participant an accelerometer. The initial training meeting typically lasts one and a half hours. Students meet a second time with study staff to demonstrate knowledge of the procedures. The first official responsibility any student performs is done alongside the PI or the graduate

research assistant. To reduce errors associated with accelerometry tasks, a study template is used within the software provided by the manufacturer that limits student input during device initialization to the date when data collection begins. Student volunteers are scheduled according to their availability, and each is asked to provide a minimum of two hours per week on a given day of the week over the course of at least one semester. When possible, student volunteers who distribute accelerometers are matched geographically to participants' locations that are close to their own. Students are trained to track their mileage and complete reimbursement forms; they are then reimbursed at the standard university mileage rate.

A similar process is used for other clinical testing involving final outcome measures assessed at one year postpartum. Students read MOOs for the visit flow, and for conducting body composition and hand grip strength testing. The principal investigator (PI) meets with students for training and at a separate time, observes each completing procedures with an adult not known by the student. The PI also tests the student's knowledge about the procedures and whether he or she can adequately explain results from the body composition and grip strength testing to the participant. The PI is present for the student's first official study visit to ensure procedure compliance. All student volunteers are given the cell phone numbers of the PI and the graduate research assistant, in the event assistance is needed for any aspect of study procedures. Once a student has performed a given task for about 6 months, opportunities for engaging in different tasks are offered.

In addition to training students on study-specific procedures, the principles addressed in HIPPA, human subjects research training, and the importance of scope of practice, are reiterated. How study procedures maintain participant privacy is demonstrated by the required use of university email, which is encrypted for transmission of protected health information (PHI). Appropriate hygiene practices are enforced when interacting with participants who are caring for infants and toddlers; students with acute illness are not allowed to distribute accelerometers or conduct one-year study procedures. Other than introducing oneself and inquiring courteously about the baby and/or participant, students' interactions with participants are limited to the procedures outlined in MOOs. Students do not provide medical advice or answer questions relative to pelvic floor health. Students refer participants with medical questions to a clinical coordinator or a study investigator.

Student learning is prioritized in the process of their engagement. Therefore, the PI and the graduate research assistant hold afternoon and/or evening sessions every few months at which food is provided. All students attend at least one additional scholarly opportunity, and most attend 2–4, and typical attendance ranges from 4 to 10 students (~20 to 80% of the total, depending on the semester). These sessions address topics such as pelvic floor health and dysfunction, and the specific aims and hypotheses of the overall Program (sometimes required for graduate school applications and/or interviews). The sessions include presentations by medical students and other allied health professional students, and the opportunity to ask questions surrounding the research process. Further, students engage study staff and each other in problem-solving discussions about their particular responsibilities. Student volunteers are also invited to quarterly MAP investigator journal club presentations and associated discussion. While not required, some students contribute

to these sessions by critiquing a manuscript, summarizing literature about an area related to physical activity, or proposing ancillary analyses. Students' proposals for ancillary analyses using study data are voted forward by the full interdisciplinary team of MAP investigators, who provide input and assistance with planning and analysis.

Improving Study Quality

Engaging undergraduate students in MAP improves study quality. Many of the students are state residents and are close to the age of MAP participants. They understand the local culture and engage participants in brief conversation, principally to clarify accelerometry procedures, but also to inquire about the participant and her baby. Often, those enrolled in cohort studies have limited personal interaction with study staff, which could threaten retention rates. Having students personally distribute accelerometers ensures that participants have interaction with study staff outside of the clinical environment. Because students are the eyes and ears in the field, they can also provide meaningful feedback to the PI relative to these procedures, should any issues arise, along with questions from the participants. Questions related to medical advice are directed to the graduate research assistant, a clinical coordinator, or a study investigator; these individuals may answer the question or refer to the participant to her health care provider depending on the type of question. Additionally, the approach to accelerometry has helped retain devices. To date, with more than 300 participants completing accelerometry testing, only two devices have been lost.

The backgrounds of students also improve study quality. Because of their career aspirations, many undergraduate students in kinesiology have some experience working in health care. Those with health care experience are familiar with record keeping and privacy issues relative to PHI, and they are accustomed to conversing with a variety of individuals. Some students are fluent in Spanish, which is very helpful in communicating with Spanish-speaking participants. Lastly, students are technology-savvy. They are comfortable with procedures that require multiple computer interfaces, and are familiar with problem-solving strategies related to technology, which is very helpful when working with accelerometry.

Some may express concern for whether undergraduate students, from freshmen to seniors, will strictly adhere to expectations and maintain protocol fidelity. The process followed in this report involves considerable student commitment to general and protocol-specific training, regular staff checks on procedures completed by students and in-person group sessions to address any aspect of the study, and provides contact with study staff and investigators and easy access to study MOOs for consultation. At this writing, excessive protocol errors made by students have not been observed.

Discussion

Physical activity, exercise and fitness are common exposures addressed in the context of clinical research (Knowler et al., 2002; Nadeau et al., 2016; Shah et al., 2016; Winters-Stone et al., 2015). The MAP Study, while housed within the Department of Obstetrics and Gynecology, relies upon Kinesiology facilities, faculty and students to conduct the physical activity and fitness assessments included in the protocol. This approach to engaging

undergraduate students in research combines the strengths afforded by the infrastructure of an academic health sciences center, the multi-disciplinary nature of the Program Project, and the expertise of kinesiology-trained personnel. Those in kinesiology are keen to standardized measurement techniques, many of which students learn in the curriculum. Further, high undergraduate kinesiology student numbers mirror national trends, affording great capacity to expand clinical research efforts (Thomas, 2014). November, 2015 marks the beginning of this program, and to date, 22 students have been trained and participated in the research. In any given semester, approximately 12–15 student volunteers participate in some aspect of the MAP Study, and most engage for at least two semesters. The most invested students are those that have completed all training modules. All students that completed all training modules participated for at least one semester (and only one student discontinued participation after just one semester), while two students did not complete all required training, and their level of engagement was limited and short-term since they could not work with PHI.

Best practices for working with undergraduate students in research have been proposed (Della-Piana, Della-Piana, & Gardner, 2014). The nature of any project will dictate the type and amount of interaction students have with faculty, however, a key point is that faculty are available for consultation. Students who volunteer for MAP have cell phone and email contact with faculty, the graduate research assistant and study coordinators. While faculty members are typically tied to email, the approach used herein encourages the use of text messaging, which is the preferred form of communication for students. Additional interactions during training and supplemental educational sessions afford more in-depth conversation related to the study and to the research process. Important for the student is having some degree of responsibility and autonomy on the project. This is achieved by asking students to commit a minimum of 2 hours (most commit 3) on a particular day, during which they complete specific tasks. Once trained, they utilize MOOs to confirm protocols, and largely work independently. The PI makes sporadic visits to the laboratory to confirm that students adhere to the body composition and hand-grip testing MOOs and the graduate research assistant confirms that students follow correct procedures for all accelerometry-related procedures. Some students with exceptional involvement in the study have contributed to research abstracts and publications. Any email correspondence with student volunteers reinforces their important roles on the study and expresses gratitude for their efforts.

Other benefits include the opportunity to observe an interdisciplinary approach to problem solving and enhanced skill development, both relevant to the MAP Study. Skills students may learn include using accelerometry and assessing measures of fitness, communicating with participants, clinical coordinators, graduate students and investigators, working collaboratively with diverse faculty, staff and other students, and developing confidence and persistence in problem solving (Della-Piana et al., 2014). In some ways, students volunteering with the MAP Study learn skills typically associated with laboratory-based courses, although activities are driven by research aims and hypotheses, and not by specific student learning outcomes.

The process of engaging undergraduate students in the MAP Study has not yet been institutionalized. Instituting formal research coursework with well-defined student learning outcomes would merge well with hypothesis driven and investigator initiated research. Within kinesiology, some authors suggest that research engagement provides a bridge between the mostly coursework-driven undergraduate experience and the critical thinking required for graduate study in Physical Therapy (Wallmann & Hoover, 2012). Perhaps a stronger bridge than what is currently provided in the kinesiology program from which most student volunteers are drawn would include research foundation coursework followed by the hands-on, real-world participation activities as a laboratory. Rodenbusch and colleagues have instituted formal research coursework over 3 semesters, beginning in the freshman year (Rodenbusch, Hernandez, Simmons, & Dolan, 2016). These authors recognized the inefficiency of providing large numbers of undergraduate students with research experience by way of individual faculty-led projects. Their approach includes a series of research courses over 3 semesters. Engaged students have demonstrated persistence to complete degrees in STEM disciplines, and increased likelihood of graduation within 6 years when compared to students not engaged in the research series. While these authors did not see higher grade point averages among students engaged in the research series, others have observed better grades and persistence in science-based majors among underrepresented students who participated in focused coursework that included research engagement (Toven-Lindsey, Levis-Fitzgerald, Barber, & Hasson, 2015). The focus of the National Science Foundation on improving undergraduate education in traditional STEM fields is equally relevant to kinesiology (O, Sherwood, & Yingling, 2016). O and colleagues describe a recent program in kinesiology that combines formal and volunteer undergraduate participation in research in which students perceived high academic achievement, professional development and skill acquisition associated with their involvement (O et al., 2016).

Benefits to faculty relative to the engagement of undergraduate students in research may be limited, especially when programming is not formally calculated into teaching or research workloads (O et al., 2016). However, in the case of the MAP Study, the accelerometry protocol and fitness assessments could not be accomplished without the reach and value added by student involvement. Therefore, student contribution and retention are vital to MAP Study success. Some faculty have reported improved research productivity with formal implementation of research into a basic science curriculum (Kowalski, Hoops, & Johnson, 2016). Certainly, faculty enjoy intrinsic rewards associated with observing student maturation and goal achievement and when students contribute to publications and/or presentations at professional meetings, or gain acceptance to graduate programs, these milestones have the potential to benefit the larger academic unit.

Limitations

The process described has limitations. Student participation is voluntary and similar engagement may not be seen in a required program. The investigators have not systematically collected student satisfaction, learning, or other indicators of success. While the process is well defined and a number of undergraduate student volunteers have been accepted to post-graduate clinical programs, directly linking such indicators of success with MAP Study participation cannot be done at this time. The decision that students would

hand-deliver accelerometers to participants did result in a change in the original protocol, as it seemed necessary to exclude participants that live more than 60 miles from the university; however, at this time, only 189 of 1746 (10.8%) potentially eligible women have been excluded for this reason.

The approach described in this paper would likely benefit from formalizing undergraduate students' research experiences, much like those described previously in traditional STEM curricula. Administrators encourage the engagement of undergraduate students in research, and the research environment at this university is capable of sustaining such efforts. The granting agency is informed of the engagement of student volunteers and additional student training and mentorship approaches are detailed through annual reporting mechanisms. Attributing metrics of student success will be beneficial for programs such as this to earn institutional support in the form of curricular offerings, faculty workload adjustments and space allocation for research requiring additional student personnel. Over time, it will be possible to determine whether kinesiology students with early research experience are more likely to remain engaged in research in their post-graduate careers.

Conclusion

Engaging undergraduate kinesiology students in the MAP Study addresses a number of elements recommended as best practices for student experience. Additionally, the reach and skill set afforded by student engagement allows for efficiency in conducting the MAP Study protocol while providing students with unique, hands-on learning opportunities. Introducing undergraduate kinesiology majors to the topic of pelvic floor disorders may have the added benefit of alerting them to conditions that many women have yet do not discuss openly, even with health care providers (Harris, Link, Tennstedt, Kusek, & McKinlay, 2007; Koch, 2006). Many of the student volunteers express surprise that existing physical activity recommendations do not explicitly address pelvic floor health for postpartum women, and they are excited to be part of a study aimed to shed light on the role of physical activity and fitness in postpartum pelvic floor support and symptoms. The MAP Study may be a starting point for shaping future postpartum physical activity recommendations, and the kinesiology student volunteers engaged in this process can claim to have played a vital role in that process.

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Table 1

Steps involved in engaging the student volunteers

Steps	Specific Activities
Recruitment	Brief description in large undergraduate courses Alert undergraduate academic advisors and colleagues about research program Word of mouth amongst students
Volunteer Program Training	Online volunteer application (5 min [*]) Background check (generally takes 1 week to clear; followed by 14 to 48 hour turnaround time to make volunteer a hospital affiliate) Immunizations, flu shot and TB test at Work Wellness Center (15–20 minutes) On-line safety and HIPAA training (1 to 2 hours) Provide documentation to Volunteer Program (10 minutes) Receive PIN to log volunteer hours (5 minutes) Volunteer orientation (1 hour) Pick up form for ID badge
Institutional Review Board Requirements	Register in IRB system (5 minutes) Online Human Subjects Protection Training (2 to 4 hours) Additional HIPAA Training (10 minutes) Good Clinical Practices Training (2 to 3 hours) Financial Conflict of Interest Disclosure (1 minute) Research Compliance Officer in Department of OB/GYN reviews information, and when complete, adds student to IRB protocol
Protocol-Specific Training	Accelerometry drop off and pick up instructions, including communication guidelines, charging and initializing devices (1.5 hours) Scheduling accelerometry drop off and pick up with participants--telephone scripts, voice mail instructions, and recording ^{**} (2 to 4 hours) Accelerometry downloading, time-stamping and raw file creation ^{**} (3, 1-hour sessions) Year 1 study flow, and body composition and handgrip strength assessment (2, 1.5-hour sessions)

^{*} Usual time required by student to complete task

^{**} Specialized requirements, requires a 2–3 semester commitment, ongoing training required