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Position Held: Assistant Professor, Department of Health Science

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Project Title: Publishing and Funding Behavioral Interventions with Pregnant Women

Field of Study: Health

Project Abstract: Physical activity and a healthy diet are important during pregnancy. They may be particularly valuable for preventing excessive weight gain, which is important, as maternal obesity and excessive weight gain increases the risk for many negative health outcomes (e.g. pre-eclampsia). Despite the numerous benefits of physical activity and healthy eating during pregnancy, physical activity levels typically decrease and often do not return to pre-pregnancy levels post-partum. Furthermore, pregnant women often have a difficult time engaging in healthy eating behaviors and balancing their calories to prevent excessive gestational weight gain. Behavioral interventions, which focus on teaching individuals the skills and behaviors necessary to help initiate and sustain changes in behavior, have been found to be an effective way to help individuals overcome barriers to physical activity and healthy eating. Unfortunately, evidenced-based, behavioral interventions designed specifically for pregnant women are lacking. Furthermore, those that have been conducted have yielded inconsistent results with regard to behavior change, suggesting that various components of the intervention were ineffective and potentially inappropriate for pregnant women, given the unique barriers they face (e.g. nausea, tiredness, a lack of knowledge, low energy, physiological changes such as back pain or soreness). A better understanding of the barriers women face and what type of physical activity and dietary programs would be the most conducive for encouraging regular physical activity and healthy eating throughout a woman's pregnancy are imperative for developing and implementing an efficacious behavioral intervention in a population for which these behaviors have numerous benefits. The proposed project includes four inter-related goals, all of which expand on the ongoing research I am currently engaged in regarding behavioral interventions in pregnant women: (1) publish papers on a funded pilot behavioral intervention that will begin in January 2016 in peer-reviewed journals, (2) present the findings from the intervention at regional and national conferences, (3) attend a National Institutes of Health (NIH) grant writing workshop hosted by the University of Michigan to better understand and learn tips for writing a solid NIH application, and (4) develop and submit an external grant application that would expand upon the findings of the pilot intervention study. This proposal includes opportunities for student engagement and mentoring, as students will have opportunities to develop and present abstracts at conferences, and to develop manuscripts using data they have helped collect in previous projects (i.e. the behavioral intervention with pregnant women). If funded, I plan to use a majority of the funds to address the need for time for this project. I am requesting three credits of release time for each of the Fall and Winter semesters in 2017 and 2018, and supplemental spring/summer pay in 2016-2018. I am also requesting funds to attend the NIH granting writing workshop.

Submission to the Internal Review Board (if applicable) Yes No (Note: IRB applications will be submitted as a part of the other funded projects)

Start of project: January 01, 2016

End date of project: December 31, 2018

Description of Proposed Project and Activities

Background/Previous Research: Physical activity is safe and recommended for healthy women during pregnancy¹. Physical activity, as well as healthy eating, may be particularly valuable for preventing excessive weight gain, which is important, as maternal obesity and excessive weight gain increases the risk of pre-eclampsia, gestational diabetes, gestational hypertension, delivery by caesarean section, delivering large size for gestational age infants, and childhood obesity². Despite the numerous benefits of physical activity and healthy eating during pregnancy, physical activity levels typically decrease and often do not return to pre-pregnancy levels post-partum³. Furthermore, pregnant women often have a difficult time engaging in healthy eating behaviors and balancing their calories to prevent excessive gestational weight gain. Pregnant women may encounter a number of unique health-related barriers to physical activity participation and healthy eating including nausea, tiredness, a lack of knowledge, and low energy. Some of the physiological barriers to physical activity participation specifically include (but are not limited to) shortness of breath, musculoskeletal problems such as back pain or soreness, experiencing early contractions, and concern with pregnancy complications (e.g. harm baby, induce premature labor)⁴.

Behavioral interventions have been found to be an effective way to help individuals overcome barriers to physical activity and healthy eating. These interventions focus on teaching individuals the skills and behaviors necessary to help initiate and sustain changes in behavior such as physical activity and diet. Common targets of these types of interventions include goal setting, self-monitoring, social support, self-efficacy, reinforcement management, relapse prevention, among others. Despite their effectiveness, much work remains on how to effectively initiate life-long behavior change⁵⁻⁷. Unfortunately, evidenced-based, behavioral interventions designed specifically for pregnant women are lacking and remain an underutilized mechanism for behavior change during pregnancy. This is problematic, as a large body of research has highlighted the importance and efficacy of utilizing behavioral interventions to overcome barriers to increase physical activity and improve nutritional behaviors during pregnancy, thereby decreasing the risk for adverse pregnancy outcomes^{10,13,34,41-44}. Furthermore, available behavioral interventions have yielded inconsistent results with regard to behavior change⁴⁵, suggesting that various components of the intervention were ineffective and potentially inappropriate for pregnant women, given the unique barriers they face⁴⁶.

A better understanding of the barriers women face and what type of physical activity and dietary programs would be the most conducive for encouraging regular physical activity and healthy eating throughout a woman's pregnancy are imperative for developing and implementing an efficacious behavioral intervention in a population for which physical activity and healthy eating have numerous benefits. Although barriers to physical activity and healthy eating have been described relatively well in the literature, less is known about how behavioral interventions must be designed and delivered to be effective in increasing physical activity and healthy nutritional behaviors among pregnant women. Intervention components to consider include (but are not limited to) details regarding its delivery and content. Furthermore, it might be beneficial to consider a novel approach to intervention delivery and mode, as previous research utilizing behavioral interventions within samples of pregnant women have yielded inconsistent results⁴⁶, and have not adequately addressed many of the common barriers to engaging in healthy behaviors pregnant women commonly face.

Proposed Project: The goal of the proposal for the Braun Fellowship is to expand on the ongoing research I am currently engaged in regarding behavioral interventions in pregnant women and to develop a National Institutes of Health (NIH) and/or similar funding mechanism (external grant) application. It is important to note that this type of work requires a team effort; the research projects for which I already have funding for includes collaboration with another faculty member within the Kinesiology Department, in addition to the involvement of a number of undergraduate students. This proposal has 4 main goals: (1) publish papers on a pilot behavioral intervention that will begin in January 2016 in peer-reviewed journals, (2) present the findings from the intervention at regional and national conferences, (3) attend a

NIH grant writing workshop hosted by the University of Michigan to better understand and learn tips for writing a solid NIH application, and (4) develop and submit an external grant application that would expand upon the findings of the pilot intervention study.

Goals 1 & 2- publish papers on a pilot behavioral intervention that will begin in January 2016 in peer-reviewed journals and present the findings from the intervention at local and national conferences. External funding agencies value previous experience and initial findings before funding a study. Previous funding is supporting the research for conducting focus groups with pregnant women to understand barriers to healthy eating and physical activity during pregnancy, and to also understand what types of physical activity and dietary programs pregnant women value. The focus groups will take place in Fall 2016. Following this, my collaborator and I have secured funds to develop and implement a physical activity and dietary intervention with pregnant women. This intervention starts early Winter 2017 and last approximately one year. Collecting pilot data and showing the feasibility for successfully recruiting for and implementing a behavioral intervention in pregnant women is a requirement for external funding from federal agencies. In addition to this, federal agencies want to see evidence of the ability of the team to publish their findings and disseminate the results to those who could benefit (i.e. other researchers, physicians, pregnant women).

Although I have a very strong publication record, I have limited publications focusing on pregnancy. As a part of the Braun Fellowship, I, in collaboration with the research team, will analyze data, write manuscripts, and publish papers in peer-reviewed journals such as *Annals of Behavioral Medicine*, *Journal of Physical Activity and Health*, *Medicine and Science in Sport and Exercise*, *Public Health*, or similar journals. Publications will include the results from the focus groups and data from the intervention. We are collecting a lot of data from the intervention study, including survey data on demographics, pregnancy-related data, psychosocial variables that can be tested as mediators (e.g. self-efficacy, social support, self regulation), height and weight, physical activity (both via survey and objectively via Actigraph accelerometers), and dietary data via 24-hour dietary recalls. Data will be collected three times throughout the intervention (two times during pregnancy and then 3 months post birth). The women will wear a FitBit throughout the study and weigh weekly. The amount of data available to use for publications will allow for a number of papers. We have specific plans to publish a primary outcomes paper looking at the results of the intervention on weight gain, physical activity, and dietary outcomes during pregnancy, a 3-month follow-up paper (i.e. what happened 3 months post delivery with physical activity, dietary outcomes, and weight retention), a paper to better understand how the intervention exerted its effects, a baseline predictor paper where we will look at what predicts success during the intervention, and a baseline predictors paper that predicts outcomes at the 3-month follow-up. Release time during the Fall and Winter semesters will allow time for writing, as I will take the lead on many of these papers, in addition to mentoring students on papers they are interested in writing. Furthermore, spring/summer pay will allow me to focus solely on writing and publishing, which is often delayed due to teaching responsibilities in the spring/summer terms.

In addition to publishing papers, I will submit abstracts to local and national conferences, where I can present the findings from this research. This dissemination of the findings to diverse audiences (e.g. researchers, practitioners, administrators) will provide the necessary evidence to federal agencies of our ability to not only publish, but to disseminate our findings on multiple levels (i.e. local, state, national). I will submit abstracts for oral and/or poster presentations to the National American College of Sports Medicine (ACSM) conference and the National Society of Behavioral Medicine (SBM) conference (both held annually), and to present at the local ACSM chapter conference.

Goal 3- attend a NIH grant writing workshop hosted by the University of Michigan to better understand and learn tips for writing a solid NIH application. The Grant Training Center offers a 'Writing/Designing Winning NIH Proposals' workshop. The workshop assists in understanding the

procedures for writing and submitting NIH grants. According to the advertisement, after attending the workshop, you will be able to know how to: read and interpret Requests for Applications (RFAs), determine the right grant mechanism for your research idea, build an airtight case for funding, understand the scoring and review process, and submit proposals that reach the top of competitions. This one-day workshop would assist me in understanding the application, submission, and scoring process, while also providing value insight in writing a strong application, which would increase the chances of successful funding.

Goal 4 - develop and submit an external grant application that would expand upon the findings of the pilot intervention study. The ultimate goal of the proposal for the Braun Fellowship is to develop a National Institutes of Health (NIH) and/or similar external funding mechanism application to expand on the ongoing research my collaborator and I are currently engaged in regarding behavioral interventions in pregnant women. The previous goals (publishing, presenting, and attending the workshop) will assist in setting me up for a strong, competitive application. The R15, which is a NIH Academic Research Enhancement Award (AREA), supports small research projects in behavioral sciences by faculty in health professional schools that have not been major recipients of NIH research grant funds. This funding mechanism provides up to \$300,000 over three years, and (1) supports meritorious research, (2) exposes students to research, and (3) strengthens the research environment of the institution. The submission would likely go to the National Institute of Child Health and Human Development (NICHD) that ensures that every person is born healthy and wanted, that women suffer no harmful effects from reproductive processes, and that all children have the chance to achieve their full potential for healthy and productive lives. In pursuit of these goals, NICHD supports a broad spectrum of research on normal and abnormal human development, including contraception, fertilization, pregnancy, childbirth, prenatal and postnatal development, and childhood development through adolescence.

In addition to NIH funding, a number of other foundations provide funding specifically for research/projects related to pregnancy, i.e. the Bill and Melinda Gates Foundation. In conjunction with the Sponsored Programs Office at SVSU, I will identify potential funding mechanisms that are in line with our goals through the Foundation Directory Online (a database SVSU offers), and decide on opportunities that seems most promising, while providing the funds and support needed to implement the research idea. Bottom line - external funding will allow us to expand on our research agenda.

Description of benefits to faculty, community, and the University

Benefits to Faculty. The Braun Fellowship will be beneficial as I continue my research agenda as young faculty member. This award would build on previous research at the University. During my first year (2013), I was awarded a Faculty Research Grant to implement and evaluate a 12-week behavioral intervention in older adults. I became a trained facilitator of the Active Living Every Day⁵³ and Healthy Eating Every Day⁵⁴ programs. A colleague and I, in addition to students, recently completed the study (August 2015) and data analysis is underway. This study measured physical activity and dietary behaviors, in addition to the theoretical constructs targeted by the intervention (e.g. social support, self-efficacy) which will allow us to conduct mediation analyses⁵⁵ in an effort to better understand how the programs changed physical activity and dietary behaviors. A goal of this project was to allow us, as investigators, to utilize the experiences learned from these interventions while refining and expanding our skill sets, eventually exploring the prospect of intervention development and implementation within other populations (specifically pregnant women). Consequently, I applied for a Faculty Research Grant in 2014 and was successfully funded (funding cycle is July 2015-June 2016). A colleague and I, in addition to students, will conduct focus groups with pregnant women to better understand the barriers to physical activity and healthy eating during pregnancy, and to better understand what types of physical activity and dietary programs pregnant women want. The second part of this project is to develop a behavioral

physical activity and dietary intervention, based on the findings from the focus group and an exhaustive review of the literature for evidence-based programs, for pregnant women. To build on this research, a colleague and I applied for an Allen Grant and were successfully funded (funding cycle is June 2015-May 2017). This grant will allow us to implement the behavioral intervention in pregnant women, collect pilot data, and test the feasibility of the behavioral intervention. The Braun Fellowship builds on my previous funding and projects, and will assist in my goal of securing external funding to further my research agenda at SVSU.

The Braun Fellowship will also benefit the students in my classes. I teach a Research Methods course and multiple Public Health courses, so I will be able to incorporate these first hand experiences into the classroom. Students find these experiences helpful in understanding complex and confusing topics, particularly when it comes to research. Practical, real-world, beyond-the-textbook examples are critical.

Benefits to Community. The scope of work proposed in the Braun Fellowship has the potential to impact the local, state, and national community, and various audiences. Although conducting research is important, even more critical is disseminating your findings to other researchers, health professionals, and practitioners. Publishing in peer-reviewed journals and presenting at both national and local conferences are effective avenues for disseminating important findings. Second, the scope of work proposed has the potential to benefit the health of pregnant women across the United States, including women in the state of Michigan, and even more, women in Saginaw County, where the health is among the poorest in the state and infant outcomes related to physical activity and nutritional behaviors (i.e. low birth weight and infant mortality) are among the highest^{56,57}. The overarching, long-term goal of this project is to improve the health of pregnant women. Third, obtaining external funding will allow us to implement and eventually disseminate an evidenced-based program more widely, both within the Great Lakes Bay Region and throughout the state of Michigan. Finally, the program, if deemed successful, could be utilized by researchers and nutrition/exercise professionals regionally and nationwide, yielding enormous public health benefits. Increasing physical activity and improving nutritional practices among large groups of pregnant women, whether at the regional, state, or national-level, has the potential to have a significant impact on population health.

Benefits to the University. The potential benefits to Saginaw Valley State University are numerous. I am proposing to submit numerous manuscripts for publication in peer-reviewed journals, and to present the findings at regional and national conferences. This would significantly increase SVSU's visibility through nationally renowned conferences and journals. The successful acquisition of external funding may also potentially provide monetary benefits to the University. Furthermore, this project would contribute to SVSU's Community Engagement Classification by the Carnegie Foundation for Advancement of Teaching. Finally, promoting these types of research opportunities to students during recruitment events may assist in attracting students to attend SVSU.

Student engagement and opportunities are very important to me as a faculty member at SVSU. In the previous and ongoing projects mentioned, undergraduate students have been involved in all aspects of the research projects. They have assisted with recruitment, phone screeners, data collection (surveys and physical measures), leading group-based intervention sessions, and data entry, among other things. They will continue to do these types of activities for the focus groups this Fall, and the pregnancy intervention that will start in Winter 2016. They will play a very active role in this intervention, serving as 'health coaches' for pregnant women. Hands-on, practical learning experiences are invaluable. Our students have gotten into very competitive, rigorous graduate programs (e.g. Duke, University of South Carolina, Michigan State); these types of experiences are often rare for undergraduate students, and very useful when applying to graduate schools.

The Braun Fellowship will allow me to continue to guide and mentor students. I will meet with students regularly to provide guidance, feedback, and to discuss various aspects of the research process that will help them in becoming an independent researcher, which will be useful as many of our students plan on attending graduate or professional school upon graduating from SVSU. Furthermore, this fellowship will allow me to guide and mentor students as they take the 'next steps' with the projects they are involved in. This includes using the data they have helped to collect to submit abstracts to conferences, and to write manuscripts (first author or co-author) for publication. The writing process can be overwhelming to many students, but with guidance and mentoring, it can become more 'manageable'. As a part of the writing process, I will mentor students on how to run analyses using SPSS, how to interpret the data, and how to write scientifically. I will also work with them closely as they learn the parts of a research paper, what should be included in each section, how to cite literature, and how to submit a manuscript once it is prepared (e.g. using the online portal, formatting, cover letters, etc). Finally, if students are interested in learning how to write a grant, I will include them in aspects of the grant writing process as well.

Description of the professional or academic work for publication or presentation

This proposal aims to expand on my current research agenda focusing on promoting physical activity and healthy eating among pregnant women through behavioral interventions. As described in more detail under the proposal goals, I will write and publish a number of manuscripts in peer-reviewed journals, and present our research findings at regional and national conferences (e.g. ACSM, SBM). Furthermore, upon completion of this fellowship, I will have a NIH grant (or other external grant mechanism) application completed and ready for submission in hopes of securing external funding to continue and expand upon my research agenda.

Description of the last 5 years of teaching, research, and service demonstrating past performance and contributions to the University.

Teaching. My teaching responsibilities within the Department of Health Sciences lie mainly in the areas of Research Methods and Public Health. I have consistently received strong student evaluations and strong evaluations from my peers.

Research. As described above, I have received two Faculty Research Grants and an Allen Foundation Grant (co-investigator) during my 2 years at SVSU. In addition to this, I have received a Faculty-led Research Grant and have helped a student submit a Student-led Research Grant (although not funded). I am also the Evaluator on a >\$1 million HRSA grant aiming to open an interprofessional healthcare clinic, a member of the Research Team for a ~\$500,000 Project Safe Neighborhoods grant aiming to reduce violent gang and gun crime in Saginaw, and the Evaluator on a Building Healthy Communities grant aiming to improve community health in Bay County. Furthermore, I was a co-investigator on the Midland-County Health Survey (completed 6/2015).

I also have a very strong publication record in peer-reviewed journals. In 2013, I had 14 publications (5 first author), in 2014 I had 13 publications (5 first author), and in 2015 I have had 7 publications so far (4 first author), with additional manuscripts under review and/or in progress. I also continue to present my research at conferences, including the National Society of Behavioral Medicine conference.

Finally, this year I was asked to be a contributor to the American College of Sports Medicine's Guidelines for Exercise Testing and Prescription, 10th Edition. This textbook is the 'go-to' resource for anyone conducting exercise testing or exercise programs, globally. I co-authored Chapter 12: Behavioral Theories and Strategies for Promoting Exercise.

Service. I have engaged in service at the department level, university level, and community level during my 2 years at SVSU. Upon starting here, I took a strong lead in redesigning our curriculum (via CAPC) and adding ‘tracks’ within our major. One of the tracks is a public health track; in an effort to expand it (which is a goal of the department), I have started to create new courses, the first of which I am piloting this Fall (Principles of Health Behavior Change). I am an active member on the Committee on Academic Information Technology (CAIT), have served on multiple search committees, both in and outside of our department, have volunteered for university recruitment and/or new or current student events (e.g. BAISD, Fresh Start, Fall Admissions Open House), and volunteered for the NFL Play 60 event in Bay City.

Budget supporting project proposal

In order to accomplish the aforementioned goals described above, I need time to focus on this project. Therefore, I am requesting release time for the Fall and Winter semesters, during years 2 and 3 (I have release time from another funding mechanism for 2016). It will cost approximately \$2,236.50/semester to cover the costs of an adjunct for a 3 credit course (see below for more details). I am also requesting money to pay for spring/summer work for each of the 3 semesters (see below for more details). Finally, I am requesting \$375 to cover the costs of the NIH proposal workshop.

Year 1 – 2016: Spring/Summer salary includes FICA and retirement	\$12,500
Year 1 Total	\$12,500
Year 2 – 2017: 1 course release time (3 credits) during fall & winter semesters	\$2,236.50/semester x 2 semesters = \$4,473.00
Writing/Designing Winning NIH Proposals Workshop at the University of Michigan	\$375
Spring/Summer salary includes FICA and retirement	\$7,652
Year 2 Total	\$12,500
Year 3 – 2018: 1 course release time (3 credits) during fall & winter semesters	\$2,236.50/semester x 2 semesters = \$4,473.00
Spring/Summer salary includes FICA and retirement	\$8,027
Year 3 Total	\$12,500
Project Total	\$37,500