CANDIDATE'S STATEMENT

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AREA OF EXCELLENCE

This dossier is prepared with the intent of demonstrating merit for promotion to full professor within the Department of Physical Therapy, School of Health and Rehabilitation Sciences, Indiana University (IU). The trifold missions of the department, school and institution are to be recognized through: 1) research and creative activity; 2) teaching and learning, and; 3) civic engagement (service). The metric for promotion to full professor is excellent performance within at least one of these areas and satisfactory performance within the remaining areas, with excellence being generally defined as evidence of an emerging international reputation.

I have chosen **research** as my area of excellence. It is difficult to define exactly how much time I devote towards research as my time is split between roles as a faculty member and administrator (Associate Dean for Research); however, I devote approximately 65% of my time towards research endeavors. The remainder of time is divided between teaching (20%) and service (15%). My time devotion towards research is evident by the weight of my CV to this area; however, I believe I have achieved research excellence without compromising endeavors in teaching and service.

RESEARCH STATEMENT

My research focuses on normal and abnormal functioning and treatment of the musculoskeletal system. This direction is relevant as musculoskeletal disorders are the 2nd most common cause of disability worldwide (measured by years lived with disability). My work uses a combination of preclinical (animal) and clinical models to address clinically translatable questions. To this end, while in rank I founded the Indiana Center for Translational Musculoskeletal Research (ICTMR)—a center I continue to direct.

The mission of the ICTMR is to advance health by performing studies into the normal and abnormal form and functioning of the musculoskeletal system. The center is particularly interested in bridging the gap between basic science and clinical research by translating findings from preclinical studies to clinical populations, and vice versa. The center also aims to be a resource for investigators with like interests, contribute to the training of students interested in musculoskeletal research, and disseminate the findings of musculoskeletal research.

As director of the ICTMR I have established a resource on campus that has capabilities in assessing body composition, muscle and bone health, and functional performance of research participants. As a result of these capabilities and skills, I am increasingly being called upon to contribute to pharmaceutical industry and academia-led clinical trials (discussed below). In terms of my own areas of inquiry, I answer clinically translatable questions in 3 main areas: 1) lifelong skeletal benefits of exercise; 2) skeletal consequences of selective serotonin reuptake inhibitors, and; 3) musculoskeletal conditions in sports medicine (discussed below).

OVERALL RESEARCH PERFORMANCE

Throughout my career, I have published (including 'in press' articles) a total of 109 peer-reviewed publications (68 as corresponding author) (CV p.35). This number includes 65 primary research articles (32 as corresponding), 3 systematic reviews (1 as corresponding), 6 unsolicited review articles (all as corresponding), 22 invited reviews (17 as corresponding), 5 editorials (all as corresponding), 2 published letters and 6 book chapters (5 as corresponding). Narrowing the list to articles while in rank, I published as associate professor (including 'in press' articles) a total 50 peer-reviewed publications, including 33 primary research data articles (18 as corresponding), 2 systematic reviews, 10 invited reviews (8 as corresponding), 1 editorial (as corresponding) and 4 book chapters (all as corresponding). The publications while in rank represent over 20% (50-out-of-236) of publications produced by all 25+ faculty within my school during the same time period, with the next most productive faculty member within the school publishing half as many publications during the same period.

In addition to high productivity, I have published my work in impactful journals. Thirty out of the 33 primary research data articles published while in rank were published in journals with an ISI Web of Knowledge Journal Citation Reports (2015 edition) impact factor (IF), with the average IF being 3.6. This is a high average IF considering that it is higher than all but two journals within the *Rehabilitation* category and higher than 7-out-of-82 journals in the *Sports Sciences* category of the ISI Journal Citation Reports. The high average IF for my work while in rank resulted from publishing in journals such as *Lancet Diabetes and Endocrinology* (IF: 16.3; CV article #8), *Proceedings of the National Academy of Sciences* (IF: 9.4; CV article #14), *Journal of Bone and*

Mineral Research (IF: 5.6; CV article #12), *Journal of Clinical Endocrinology and Metabolism* (IF: 5.5; CV articles #4, #13, #15), *Endocrinology* (IF: 4.2; CV article #17) and *Bone* (IF: 3.7; CV articles #18, #20, #29, #82, #83) and *Medicine and Science in Sport and Exercise* (IF: 4.0; CV article #25), to name a few.

I have not only widely published my work in impactful journals, the articles have been individually impactful. This is evident by my *h*-index of 28 to 42. The *h*-index indicates both the productivity and citation impact of a scholar, and indicates they have *h* papers that have been cited at least *h* times. ISI Web of Knowledge indicates I have 28 papers that have been cited at least 28 times. This is likely an underestimate as ISI is notoriously slow at updating its database and only reports on citations in ISI database journals, which does not include non-English journals. In contrast, Google Scholar has my *h*-index at 42. Metrics by Google Scholar are becoming more accepted as their database has a much broader coverage, including non-English journals. Citation in the non-English journals is relevant in this case as excellence in research is determined by evidence of an emerging international reputation. However, Google Scholar's limitation is the inclusion of citations in some non-scholarly sources. Given the respective limited and liberal citation counts provided by ISI Web of Knowledge and Google scholar, my true *h*-index is likely somewhere in between 28 and 42, with Elsevier's Scopus database providing an *h*-index of 33. The next best ISI Web of Knowledge *h*-index for a faculty member within my school is 17.

LIFELONG SKELETAL BENEFITS OF EXERCISE

The adaptability of bone to mechanical stimuli is well known and exercise is advocated for the reduction in bone strength and increase in low trauma fractures associated with aging. Controlled trials have shown adaptability of bone to exercise-related mechanical loading; however, the significance of the response remains debated. Reduced bone strength is mostly an age-related phenomenon, whereas the ability of the skeleton to respond to exercise appears to decline with age. This raises the question of whether the skeletal benefits of exercise completed when young persist into late adulthood where they may have anti-fracture benefits.

Towards the end of my post-doctorate studies and as assistant professor, I recognized the contrasting periosteal and endocortical surface effects of mechanical loading when young and bone loss during aging. Mechanical loading during growth resulted in bone enlargement due to the selective addition of new bone on the outer (i.e. periosteal) bone surface. In contrast, during aging it is well known that bone is lost from the inside (i.e. endocortical surface) and that periosteal bone loss rarely occurs. Putting these to facts together, I hypothesized that mechanical loading when young would enhance bone size and strength by adding new periosteal bone and that these benefits would persist long-term because of the absence of periosteal bone loss during aging.

To address the research question, I completed as assistant professor an animal study wherein I mechanically loaded (or 'exercised') one forelimb of young rats for 7 weeks using the ulna axial compression loading model. Animals were subsequently limited to home-cage activities until 2 years of age (practically lifelong in a laboratory rat) during which measures of bone health were taken. The data supported my hypothesis that the bone size and strength benefits of mechanical loading when young persist long-term. These data were published in 2007 in the leading bone journal *Journal of Bone and Mineral Research* (IF: 5.6; CV publication #44) and have subsequently been cited >120 times (according to Google Scholar). The data also resulted in the award of a National Institutes of Health (NIH) Academic Research Enhancement Award (AREA/R15) while in rank as associate professor.

The NIH R15 award was used to explore the important translational questions of whether the skeletal benefits of elevated mechanical loading during growth persist in trabecular bone and with estrogen depletion. The latter would represent the clinical scenario of exercised-induced bone adaptation during growth followed by menopause later in life. Two studies were performed—one using the rat ulna axial compression loading model to induce principally cortical bone adaptation and one using the mouse tibia axial compression model to induce combined cortical and trabecular bone adaptation. The cumulative data indicated that loading had long-term benefits on cortical bone size and strength (but not mass) and trabecular bone morphology which were not influenced by a surgically induced menopause. These data suggest that exercise may provide long-term benefits by preparing the skeleton to offset both the cortical and trabecular bone changes associated with aging and menopause. I published the studies as first and corresponding author while in rank in the influential journals *Endocrinology* (IF: 4.2; CV article #17) and *Journal of Bone and Mineral Research* (IF: 5.6; CV article #12 and Sample publication #2).

Being a clinician at heart, I was keen to translate my findings from animal models to humans. Identifying that the prospective investigation of the lifelong benefits of physical activity during growth is not practically feasible, I began exploring different internally controlled models to address the question. I identified baseball players as a potentially useful model because: 1) they unilaterally expose their throwing arm to elevated loads; 2) the game of baseball and its principal training modalities have not changed in over a century, and; 3) baseball players often retire completely from throwing once they cease professional play enabling the skeletal benefits of exercise when young to be explored in the absence of further unilateral loading.

As an assistant professor, I performed an initial study to demonstrate that collegiate-level baseball players had very large side-to-side differences (i.e. bilateral asymmetry) within the humerus, which far exceeded bilateral asymmetry due to elevated habitual unilateral loading associated with simple limb dominance observed in controls. This work was published in *Bone* (IF: 3.2; CV article #34) and lead to the award as principal investigator (PI) of a $1M NIH R01 award while in rank. With the R01 award, I recruited and tested current and former Major League Baseball players from around the country to show:

1. Professional baseball pitchers expose the humerus within their throwing arm to extreme strains that, if applied to the contralateral arm, would result in acute fracture;
2. The chronic extreme mechanical loading associated with overhand throwing in professional baseball pitchers induces a doubling of humeral strength;
3. There is progressive loss of the cortical bone mass, area and thickness benefits of exercise following exercise cessation due to medullary expansion and cortical trabecularization;
4. Half of the bone size (total cross-sectional area) and one-third of the bone strength (polar moment of inertia) benefits of exercise during youth are maintained lifelong, and;
5. Exercise continued during aging results in maintenance of some of the bone mass and more of the strength benefits of the exercise during youth as result of less medullary expansion and cortical trabecularization.

These data indicate that the 'use it or lose it' adage is not entirely applicable to the skeleton and that exercise during youth should be encouraged for lifelong bone health, with the focus being optimization of bone size and strength rather than the current paradigm of increasing mass. The data were published in the multidisciplinary sciences journal *Proceedings of the National Academy of Sciences* (*PNAS*) as first and corresponding author (CV publication #14 and Sample publication #1). *PNAS* is the world's second most cited journal after *Nature* and has an impact factor that places it within the top 2.5% of all journals (190-out-of-8778 journals listed in the 2015 edition of the ISI Journal Citation Reports) and fourth (out-of-63 journals) in the *Multidisciplinary Sciences* category (behind *Nature*, *Science* and *Nature Communications*). In addition to being published in an impactful journal, my article was also individually impactful. It was one of 5 articles featured on the cover and one of 6 papers editorially summarized in the 'In this issue' section of its respective journal issue (out of 85 papers in the issue). Since its publication, the article has been:

1. The feature of editorials in *Journal of Experimental Biology* and *IBMS BoneKEy*;
2. Acquired an Almetrics score (reflecting online attention) of 169, which places it in the: i) top 5% of all scored research outputs; ii) 99th percentile of outputs of the same age, and; iii) 94th percentile of outputs of the same age and source;
3. Cited 41 times (>20 times per year, according to Google Scholar), and;
4. The subject of local, national and international media attention, including on the *Science/AAAS* and *NIH Research Matters* websites, in *Science News* and *Parents* magazines, in the *LA Times* and *U.N. News & World Report* newspapers, and featured on *ABC Radio (Australia)*, *Doctor Radio – Sirius XM81* and *Fox2Now (St. Louis)*, to name a few venues.

PLAN FOR ONGOING AND FUTURE ENDEAVORS

The data contained in my *PNAS* paper translated our preclinical findings to provide proof-of-concept evidence in humans; however, the midshaft humerus has limited clinical relevance. Unresolved, clinically important questions include whether exercise completed when young has lasting benefits in: 1) corticocancellous sites prone to osteoporotic fracture; 2) specific regions within the bones to resist injurious loads (e.g. sideways fall onto the greater trochanter), and; 3) in women. To this end, I have recently established throwing athletes (i.e. baseball and softball pitchers) as a model that unilaterally exposes not only their upper extremity to elevated loading, but also their lower extremity. Pitchers take a large stride to generate forces within their plant leg (i.e. leg opposite their throwing arm) that are >2X bodyweight and twice those in their push-off leg. Using a combination of quantitative computed tomography, computational anatomy approaches (voxel- and tensor-based morphometry) and subject-specific finite element modeling (FEM), I have observed the proximal femurs within the plant leg of throwing athletes have: 1) 5% greater volumetric bone mineral density; 2) adaptation principally within the primary compressive trabeculae, inferior femoral neck cortex and throughout the greater trochanter region, and; 3) 4% greater estimated fracture load to single-leg stance forces than in the contralateral push-off leg. These data are currently in preparation for publication and the plan now is to explore how long the benefits persist following exercise cessation (i.e. by assessing bilateral asymmetry in former throwing athletes). To facilitate the later work, I recently submitted a competing renewal of an NIH R01 award. The application was viewed favorably receiving an impact score of 37 (30th percentile) and is scheduled to be resubmitted in the coming months.

SKELETAL CONSEQUENCES OF SELECTIVE SEROTONIN REUPTAKE INHIBITORS

In addition to exploring the lifelong skeletal benefits of exercise, I continue to have interests in the skeletal consequences of selective serotonin reuptake inhibitors (SSRIs). As assistant professor, I published a seminal paper demonstrating that genetic inactivation and pharmacological inhibition of the serotonin transporter (SERT) resulted in a phenotype of reduced bone mass, size and strength. The paper was published in 2005 in the journal *Endocrinology* (IF: 4.2; CV publication #55) and has since been cited 188 times (according to Google Scholar), including in *Cell* [x3] (IF: 28.7), *Nature Reviews Neuroscience* (IF: 29.3), *Cell Metabolism* (IF: 17.3) and *Archives of Internal Medicine* [x3] (IF: 14.0). I subsequently went on to show the negative skeletal effects of an SSRI (fluoxetine hydrochloride [Prozac]) were independent of estrogen status (CV publication #38) and weight-bearing status (CV publication #29 and Sample publication #3). The latter findings were published while in rank in the journal *Bone* (IF: 3.7) and have been cited in *Nature* (IF: 38.1) and *Nature Medicine* (IF: 30.4).

Study of the skeletal consequences of SERT inhibition is clinically important as the SERT is the target of SSRIs —popular agents for treating affective conditions. Clinical studies subsequent to my initial preclinical findings have observed that SSRI use is associated with reduced bone mass across different age groups ranging from adolescents to the elderly, increased bone loss in post-menopausal women, and increased fracture risk. I recently used the Bradford Hill criteria to explore causality between SSRIs and fracture (CV publication #75). A consistent and temporal relationship between SSRIs and fractures was identified, which appears to follow a biological gradient; however, specificity and biological plausibility remain undetermined. Biological plausibility is limited because the pathways linking SERT inhibition to bone changes remain unknown, while the specificity of the clinical data is limited due to confounding by indication and/or channeling bias.

PLAN FOR ONGOING AND FUTURE ENDEAVORS

I am currently vigorously studying the underlying pathways linking SERT inhibition and bone changes in order to provide biological plausibility for a relationship and identify modifiable pathways that may modulate the off-target skeletal effects of SSRIs. To this end, I am currently using genetic approaches involving constitutive and conditional null mutation of single and multiple genes to localize the skeletal effects of SERT inhibition and identify contributing pathways. To permit this approach, I have developed and preliminary investigated a unique animal model that carries floxed alleles of the gene encoding the SERT. This model did not previously exist and enables me to localize the origin of the skeletal effects of SERT inactivation by inactivating the transporter in isolated cells and tissues. Through preliminary crosses I have:

1. Confirmed germline transmission of the modified SERT allele & generated homozygous mice;
2. Backcrossed for 10 generations with C57BL/6 wildtype mice to generate mice with a more homozygous (99.9% C57BL/6) genetic background;
3. Crossed my mouse with EIIa-cre mice to confirm recombination and demonstrate the existence of a skeletal phenotype with ubiquitous inactivation of the *SERT* gene;
4. Treated mice with ubiquitous disruption of the SERT gene with an SSRI (fluoxetine hydrochloride [Prozac]) to demonstrate the negative skeletal effects of the SSRI are due to SERT inhibition;
5. Crossed my mouse with mice expressing Cre under the control of cathepsin-K to demonstrate SERT inactivation in mature osteoclasts does not produce a skeletal phenotype, and;
6. Crossed my mouse with mice expressing Cre under the control of 2.3 kb fragment of the rat Col1a1 promoter to demonstrate *Sert* inactivation in osteoblasts does not produce a skeletal phenotype.

To facilitate work in this area, I was awarded $104,000 of internal grant funds while in rank and I have an NIH R15 award submitted as PI that was recently reviewed and scored in the 11th percentile.

MUSCULOSKELETAL CONDITIONS IN SPORTS MEDICINE

I have research interests more related to my heritage as a physical therapist. This includes work while in rank into the pathophysiology and management of stress fractures (CV publication #78 and Sample publication #4), tendon injuries (CV publications #2, #16, #22, #28, #67, #80, #97), acute ligament injuries (CV publication #19), chronic hip and knee pain (CV publications #9, #26, #66), and non-steroidal anti-inflammatory drugs (CV publication #81). Throughout my career, I have repeatedly published in the top 3 journals and 8 out of the top 10 journals in the ISI Journal Citation Reports category of *Sport Sciences* (top 3 journals: *British Journal of Sports Medicine* [IF: 6.7; CV publications #66, #90, #91, #98, #99, #100], *Sports Medicine* [IF: 5.6; CV publications #69, #70, #71] and *American Journal of Sports Medicine* [IF: 4.5; CV publications #39, #45]).

As a result of my expertise in musculoskeletal conditions in sports medicine, I am frequently asked to present on related topics at national/international meetings. While in rank, I have been asked to present at both the Combined Sections Meetings of the American Physical Therapy Association and the Annual Meeting of the American College of Sports Medicine on sports medicine related topics (CV p.20) and approached by clinicians to provide advice regarding the management of elite athletes. Further reflecting my reputation in sports medicine, I am frequently interviewed by mainstream international media (CV p.23) and have been quoted in widely read venues (CV p.26), such as *Vogue* magazine (monthly circulation = 1.3M), *The New York Times* newspaper (daily readership = 1.4M), *Outside* magazine (monthly circulation = 0.7M), *Men's Health* magazine (monthly circulation = 1.8M), and *Fitness* magazine (monthly circulation = 1.5M), to name a few venues.

CLINICAL TRIALS IN MUSCULOSKELETAL HEALTH

An additional area that I have become increasingly involved in while in rank has been in the design and execution of controlled clinical trials related to musculoskeletal health (CV p.18). As assistant professor, I contributed to the performance of phase I trials for 3 novel compounds being tested by Eli Lilly and Company, Inc. My role was to design and perform bone and muscle mass and size measures in trial participants. My contribution to these trials resulted in an invitation while in rank to contribute on a broader scale to 3 phase II trials for one of the compounds—LY2495655 (myostatin antibody). My roles on the respective trials were varied, but included designing functional outcome measures, and writing operational manuals, recording instructional videos and training study site investigators in the performance of functional outcome measures.

As a result of my contributions, I recently co-authored publications reporting the findings from 2 of the randomized, placebo-controlled, double-blind, parallel, multicenter phase II trials (CV publications #5 and #8). The first paper (Sample publication #5) was published in the relatively new journal *Lancet Diabetes and Endocrinology* which has an IF of 16.3. The IF places the journal in the top 1% of all journals (71-out-of-8778) and the 2nd journal (out-of-131) in the *Endocrinology and Metabolism* category of ISI Journal Citation Reports. In the 6 months since its publication, the article has generated an Almetrics score of 139 which places it: 1) in the top 5% of all research outputs scored by Almetrics; 2) among the highest scoring outputs from the journal (32-out-of-607), and; 3) in the 98th percentile of all outputs of the same age. The article has also been cited 17 times in the 8 months since publication (according to Google Scholar) and was the feature of an editorial in its respective journal issue.

In addition to contributing to pharmaceutical-led clinical trials, I also contributed while in rank to 2 academia-led randomized, placebo-controlled, multicenter clinical trials. The first trial explored the dose-response effects of supplemental vitamin D_3 on serum vitamin D metabolites and calcium absorption in 323 black and white children. The study was performed in collaboration with Drs. Richard Lewis (University of Georgia), Connie Weaver (Purdue University) and Munro Peacock (IU School of Medicine), with my role including the design and performance of measures of anthropometric growth, body composition, and bone and muscle mass and size in the 85 children at the IU site. Thus far, data from the trial has yielded 4 co-authored publications, including 3 in the leading *Journal of Clinical Endocrinology and Metabolism* (IF: 5.5; CV articles #4, #13, #15) and one as first and corresponding author in *Osteoporosis International* (IF: 3.4; CV publication #21).

The second academia-led clinical trial I contributed to while in rank was an 18-month, randomized, controlled, parallel-arm intervention trial of 3 serves of dairy per day in healthy and overweight girls and boys. This study was also performed in collaboration with Drs. Connie Weaver and Munro Peacock, with my role being to design and perform measures of anthropometric growth, body composition, and bone and muscle mass and size during 503 separate participant study visits. The data from this trial were recently submitted for publication (CV publication #113).

PLAN FOR ONGOING AND FUTURE ENDEAVORS

I am continuing and expanding my contribution to the design and execution of clinical trials. Currently, I am contributing to the performance of physical function assessments for 3 phase II pharmaceutical-led trials of a fibroblast growth factor 23 (FGF-23) antibody for the management of hypophosphatemic osteomalacia. In addition, I am study site co-PI for a multisite clinical trial exploring the benefit of blood flow restricted strength training on recovery following femoral shaft fracture. I am a member of the protocol committee for the latter study, which is being administered by the Major Extremity Trauma Research Consortium (METRC) of which I am a member. In the coming years, I look to integrate my skills and the resources of the Indiana Center for Translational Musculoskeletal Research with the newly formed Indiana Center for Musculoskeletal Health (Executive Director: Dr. Lynda Bonewald) to expand my contributions to the study of musculoskeletal health.

TEACHING STATEMENT

My primary teaching responsibilities are as course-coordinator and lead instructor for *Musculoskeletal Practice Patterns I (P541)* and *II (P622)* (CV p.6). These 4 credit hour graduate courses involve 6 contact hours per week (2 lecture & 4 laboratory hours) with a class of 34-38 Doctor of Physical Therapy students and are provided each spring and fall, respectively. I present 88% of lectures and 30% of laboratory demonstrations, write and grade all written exams, and perform one-third of laboratory exams. The remaining class portions are given by a faculty colleague or adjunct faculty member; however, I am present during all class hours.

My teaching philosophy is to encourage future clinicians to be life-long critical thinkers who use the available evidence to guide their clinical decision making. This is consistent with 'Vision 2020' of the American Physical Therapy Association and the general direction of healthcare, and contrasts with the rote, recipe-like learning of historical physical therapy training. My teaching philosophy stems from clinical experience working with internationally recognized therapists who demonstrated that clinical success is determined not by an ability to memorize material, but by how well one understands basic concepts and can problem-solve to apply these concepts to individual patients. This is important to instill in students as they matriculate in my courses as musculoskeletal practice patterns represent one of the four major practice patterns in physical therapy and students proceed to clinical rotations and ultimately practice following completion of my courses.

My teaching approach is effective, based on student feedback, peer-review and other performance indicators (i.e. 100% pass rate of our students on their licensure exam). Quantitative anonymous student evaluations consistently rank my courses and instruction above average. Over the past 4 years, I have averaged scores (out of 5) of 4.54±0.13 and 4.59±0.15 for the global questions 'overall, I would rate the quality of this course as outstanding' and 'overall, I would rate this instructor as outstanding', respectively. These scores are above departmental averages. Similarly, qualitative anonymous statements from students confirm that I am instructing at the level of my pedagogic goal.

In addition to my primary teaching responsibilities, I have increasingly served in a mentorship role. This started as an assistant professor when I initiated and developed a novel mentoring program wherein high-achieving senior physical therapy students mentor junior students in anatomy, physiology and neuroscience. I initiated this program to: 1) assist junior students in the foundational sciences; 2) provide senior students an opportunity to develop teaching skills, and; 3) develop collegial connections across physical therapy classes. This program continues to run today, although I have since handed over the reins to a faculty colleague.

I have also mentored an increasing number of faculty and students in research activities (CV p.10). While in rank, I completed co-mentorship of 2 faculty (Drs. Imel and Fuchs) who were both funded via NIH mentored career development awards (K23 and K01, respectively). Both faculty have since gone on to become tenured associate professors at IU. I currently co-mentor 2 other faculty (Drs. Moorthi and Avin) who both recently awarded NIH mentored career development awards (K23 and K08, respectively), as well as mentor 2 additional junior faculty within the school (Drs. Thompson and Li). Beyond serving as a mentor on the above NIH career development awards, I currently serve as a faculty member on a NIH research training grant (T32) within the IU School of Medicine and am listed a faculty member on a NIH T32 within the IU School of Nursing that recently received a fundable score. In my role as Associate Dean for Research within the school, I serve as the 'knowledge broker' for research within the school's mentoring program and have organized initiatives to assist and mentor faculty in research. For instance, in Fall 2015 I initiated and lead a grant writing group of junior faculty which cumulated in the submission of 4 new NIH R15 applications.

While in rank, I was the primary mentor of 3 post-doctoral fellows and chair of 2 PhD committees, and I currently serve as a committee member for 2 other PhD students. Most rewardingly, over my career I have involved 28 Doctor of Physical Therapy and 5 Doctor of Medicine graduate professional students in research activities they would not otherwise have been exposed to during their degree programs. I find these students enjoy the challenge of extra-curricular research and learn valuable skills translatable to their future clinical careers. Thus far, 25-out-of-the-33 students have co-authored a peer-reviewed publication from the work they contributed to and 2 have gone on to commence or complete their PhD training. Overall, I have 55 publications co-authored by at least one student (32 in rank), published 10 peer-reviewed publications as senior and corresponding author with a PhD student as first/lead author (8 in rank), and published 8 peer-reviewed publications as senior and corresponding author with a post-doctoral fellow as first/lead author (6 in rank).

As a result of my teaching endeavors, I was the recipient of 3 teaching awards while in rank (CV p.3). In 2011, I was awarded the Early Career Excellence in Teaching Award from the American Society of Bone and Mineral Research. This national-level teaching award is given once yearly to an individual in the early stage of their career who displays a strong commitment to teaching and learning. In 2012 and 2016, I was awarded the

Trustees Teaching Award within the school—an award principally given to recognize faculty excellence in teaching. In addition to personal teaching awards, my students have been frequent recipients of national level awards (CV p.5), including Young Investigator Awards from the American Society of Bone and Mineral Research and Mary McMillan Scholarships from the American Physical Therapy Association.

PLAN FOR ONGOING AND FUTURE ENDEAVORS

I plan to continue updating and improving my teaching based on self-evaluation, and feedback from students and peers. Also, in my role of Associate Dean for Research within the school, I see unique opportunities in terms of taking a leading role in faculty and student research mentoring.

SERVICE STATEMENT

I devote approximately 15% of my time to service endeavors. I actively seek service opportunities as a means of furthering the missions of my department, school and campus, and to advance my professional development. I accept service opportunities when I believe I can: 1) provide specific expertise; 2) have a significant impact; 3) develop in my chosen area of excellence (research), and; 4) serve the better good of my department, school and campus, and the wider community.

To aid my development in research, I have been accepting of invitations to review the work of others. I have peer-reviewed 132 individual manuscripts (>20 manuscripts/yr) submitted to 52 different journals while in rank (CV p.33). I complete my reviews in a timely manner (>95% of my reviews were submitted earlier than requested by editors), and make sure that they are constructive. I believe these features contributed to my invitation and current service as section or associate editor for 4 journals (*British Journal of Sports Medicine*, *Current Osteoporosis Reports*, *Journal of Musculoskeletal and Neuronal Interactions*, and *Journal of Orthopaedic and Sports Physical Therapy*) and as a member of the editorial board of 4 other journals (*Bone*, *Bone Reports*, *Journal of Bone and Mineral Research*, and *Journal of Science and Medicine in Sport*). For the former 4 journals, I serve in a manuscript handling and decision making capacity. For my reviewing service, I have been recognized with a 'Certificate of Outstanding Contribution to Reviewing' and 'Top Reviewer Award' from the publisher of the journal *Bone* and recognized as a senior manuscript reviewer for the journal *Physical Therapy*.

I also see great value in reviewing grant applications. This keeps me current with work being done in the field, and helps me learn how funding decisions are made and what constitutes a good application. While in rank, I have twice served as an ad hoc member of the Neurological, Aging and Musculoskeletal Epidemiology (NAME) Study Section at the NIH and as an ad hoc reviewer of grant applications submitted to other funding agencies within the United States, Canada and the United Kingdom (CV p.31). Closer to home, I have served on 15 separate occasions as a reviewer of applications submitted to campus-wide funding mechanisms or internal competitions for agencies that accept limited submissions. These review activities have enabled me to: 1) contribute to the research mission of the campus; 2) guide both local and national research endeavors, and; 3) keep track of and guide research on a more global scale.

In addition to external service, I enjoy service activities at the department, school and campus levels. While in rank I have served in various research leadership roles from Director of Research within the Department of Physical Therapy to interim and subsequently full Associate Dean for Research within the school. In addition, while in rank I have served: 1) on the school's leadership committee; 2) on various school and campus search-and-screen committees; 3) the administrative review committee of the Dean of the IU School of Social Work, and; 4) on the Council of the Associate Dean's for Research, to name a few activities.

PLAN FOR ONGOING AND FUTURE ENDEAVORS

I plan to continue service in order to grow both personally and professionally, and develop the reputations of my department, school and campus. I plan to more proactively guide science and its dissemination by taking greater leadership roles within professional organizations, and on journal editorial and funding agency boards.