

Research Statement

My research focuses on helping people become and stay active. Physical activity and exercise can be widely used to prevent and treat a range of chronic illnesses, but rates of prescription adherence, or physical activity maintenance are low. I am interested in improving health-related outcomes of activity by understanding what works best for whom, and why, with reference to physical activity adherence from a phenotypic, individual differences perspective. My approach follows a strong interest in biologically elaborated theories of personality and their relevance for systematic variation in responses to exercise, and physical activity level. I aim to reveal reliable phenotypic differences in the way people respond physiologically, psychologically, and behaviorally to an exercise stimulus (both acute and chronic), as well as cognitive and behavioral responses to evidence-based intervention strategies. With this knowledge, I plan to lead the development of person-based adaptations to evidence-based exercise prescription and physical activity promotion practices, with the primary goal of enhancing exercise adherence and physical activity in target populations.

My published work provides a current overview of the evidence on the relationship between personality and physical activity. In these works, I highlight gaps and trends in the literature (e.g., a heavy reliance on self-report measures, the dominance of cross-sectional designs, the consistency of observed relationships) and make recommendations for advancing the field. In my most recent review, I present an adapted meta-theoretical framework (see Figure 1) for contextualizing personality to the study of physical activity and exercise behaviors. This framework illustrates pathways through which we might expect personality to modify responses to context relevant stimuli (e.g. features of the exercise prescription, intervention methods), providing a point of organized departure in the pursuit of knowledge in this unique niche. Additional works support the modifying effect of personality on mental health benefits of physical activity, demonstrate the importance of physical activity measurement method with reference to observed relationships with personality traits, and highlight the issue of confounding by intra-individual trait interactions (e.g., the observed suppression effect of one trait on the relationship between another trait and physical activity). Contributions from my most recent training have focused on the implementation and dissemination of worksite and community-based weight-loss interventions within integrated research/practice partnerships.

Through my extended work, I have found a paucity of evidence on how the exercise response (both physiological and psychological) is impacted by personality. Adding to this gap in knowledge is the stagnant literature linking personality to physical activity behaviors, which is saturated with associative evidence, heavily reliant on self-report measures of both physical activity and personality. I aim to advance this field of knowledge by conducting strong investigations pursuing two complementary research trajectories (1) community-based observational studies and randomized controlled trials to understand the role of personality in the success of evidence-based physical activity promotion strategies, with a goal to create scalable, trait-targeted behavioral interventions; and (2) laboratory-based investigations elaborating the moderating effect of personality on physiological and psychological responses to exercise, ultimately resulting in the development of trait-specific exercise prescriptions that maximize adherence in clinical and non-clinical populations. Both lines of research will result in methods to tailor behavior change and exercise training strategies at the individual level (e.g. trait-tailored exercise prescriptions), and to target traits at an organizational level (e.g. environmental or informational interventions that match the psychological profile of the workplace/region) to enhance the promotion of health behavior, specifically physical activity and exercise.

I have been successful in obtaining funding for my physical activity promotion work, as I was awarded a two-year fellowship from the American Heart Association. This 3-phased project began with (1) the validation of different physical activity promotion messages for potential use as a recruitment manipulation in primary care, (2) a test of the hypothesis that messages impact the reach of physical activity promotion interventions by attracting different types of people (with reference to personality) depending on how the messages are framed, and (3) testing a small intervention to determine if personality specific messaging embedded within a scalable counseling intervention could improve outcomes. I have completed all three phases of the project, and submitted results from the first phase (n=1200 participants) and the second phase (n=264) of the project for publication in the peer-reviewed literature. I am currently conducting final analyses on 24

participants in phase 3 of the project.

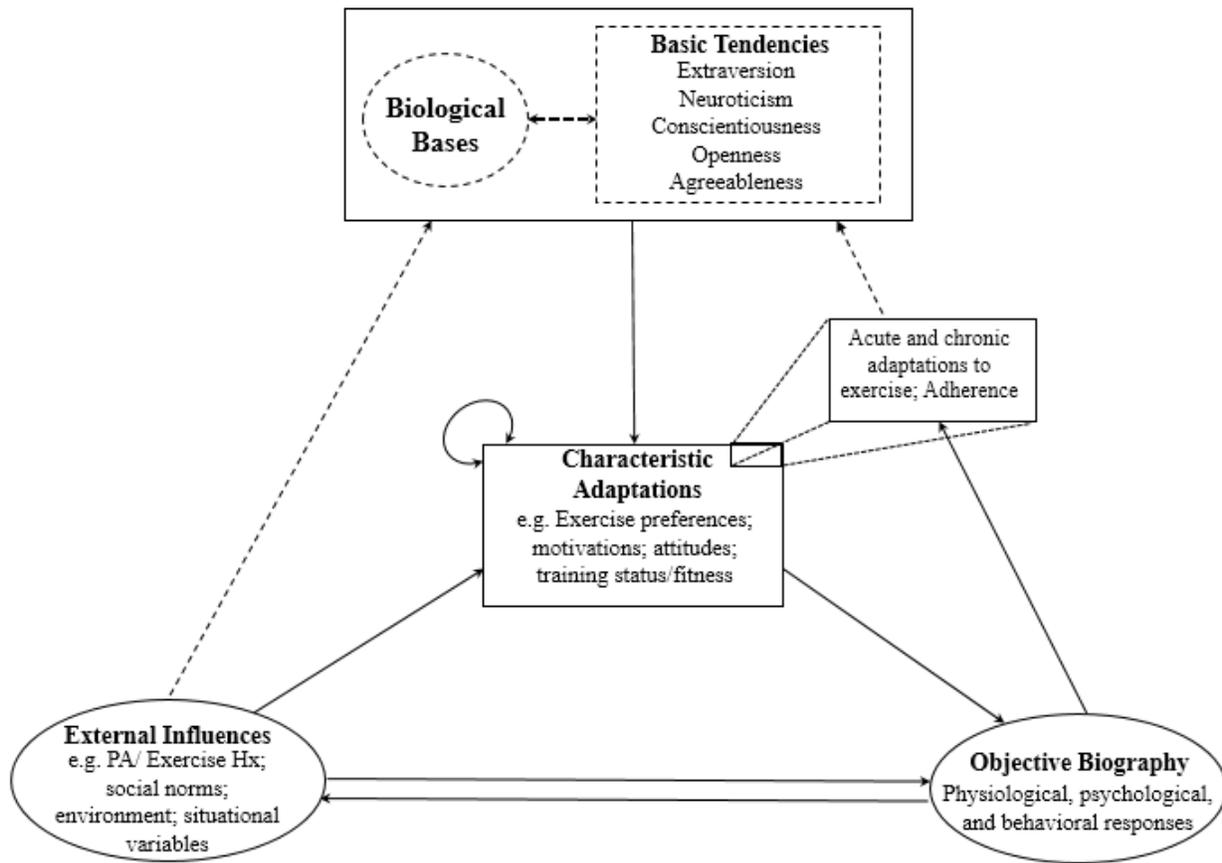
My next proposal will target R21 funding from the NIMH to support a large, community-based randomized controlled trial. This study will aim to (1) test the influence of personality on change in contextualized social cognitions and physical activity over time, and in response to an evidence-based physical activity intervention delivered online, and (2) test the impact of personality on program engagement and strategy effectiveness of the evidence-based online intervention in a randomized controlled trial. Results should inform the development of trait-targeted and/or trait-tailored strategies to maximize successful behavior change in target populations. I am working to submit this funding application for consideration in the February, 2018 cycle.

To facilitate my laboratory ambitions targeting personalized exercise prescriptions, I am developing a line of inquiry aimed at exploring links between biologically elaborated personality traits and phenotypic physiological, psychological, and behavioral responses to acute and chronic exercise. I am interested in outcome variability related to both acute and chronic exercise. I am most immediately interested in the possible link between inter-subject differences in *physiological exercise responses* (particularly autonomic modulation of the cardiorespiratory response to exercise onset, during steady-state exercise, and exercise recovery; respiratory and metabolic responsiveness and recovery) and corresponding *psychological exercise responses* (specifically, RPE and affect in response to exercise onset, during steady-state exercise, and exercise recovery), as they relate to *basic dispositional qualities* (traits reflective of individual differences in physiological and behavioral reactivity and self-regulation). I believe that basic dispositional qualities are responsible for systematic variation in outcomes related to exercise, but there is little evidence against which to judge this possibility. Building on previous work, I plan to seek funding (R21) from the NIDDK for a repeated measures laboratory experiment testing for expected moderating effects of personality traits and the physiological, psychological, and behavioral responses to acute, moderate-to-vigorous aerobic exercise. Continued work in this direction can be applied to chronic training studies and the development of personalized exercise programs with a primary focus on exercise adherence and program maintenance. The tentative submission for funding consideration for this project is October, 2018.

I am honored to have recently been invited as a collaborating investigator within an established transdisciplinary team working to revolutionize weight-loss and diabetes prevention interventions. We are developing a project to be submitted to the NIMHD for R01 funding in response to a targeted research funding announcement. The project (tentatively titled “*Epigenetic and behavioral-phenotypic mechanisms of obesity disparities and intervention response in differing sociodemographic groups: Towards personalized strategies*”) aims to 1) define mitochondrial epigenetic and behavioral phenotypic signatures of race-dependent obesity disparity, and 2) identify mitochondrial epigenetic and behavioral phenotypic predictors of inter-racial and intra-racial disparities in an obesity intervention. I have joined experts in intervention implementation, epigenetics, social determinants of health, and biostatistics to provide expertise on personality, cognitive, and behavioral factors that may contribute to obesity disparity. This project will generate fundamental information on the degree to which epigenetic changes in response to weight-loss intervention predict the effectiveness of the delivered intervention, and whether there are behavioral phenotypic differences contributing to obesity disparities. Such an understanding could inform personalized intervention adaptations to maximize impact. We aim to submit our funding application for consideration by February, 2019.

Personality is a plausible source of systematic variation in outcomes related to physical activity promotion and exercise participation. I am uniquely prepared to expand our understanding of cognitive and psychobiological mechanisms explaining these relationships. Continued work in this understudied area could help explain variability in clinical and non-clinical outcomes (e.g., training adaptations, exercise adherence, general physical activity levels, the development and/or progression of disease, risk for cardiac events). I have the training, expertise, and motivation required to successfully carry out an academic career working towards personalized adaptations to evidence-based strategies of exercise prescription and physical activity promotion. Ultimately, I hope to add structure to the broad and scattered field of evidence on personality within exercise science, and to produce information that will help to maximize exercise adherence and health outcomes of interest.

Figure 1. A model for understanding physical activity and exercise in the context of the personality system described in the Five Factor Theory.



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