Interdisciplinary Research (IDR) Origination Awards

Cover Page

Principal Investigator(s) (full-time faculty)

Name (PI listed first)	Department	College
Dr. James D. LeCheminant	Nutrition, Dietetics, and Food Science	Life Sciences
Dr. Michael J. Larson	Psychology	Family, Home, and Social Sciences (FHSS)
Dr. Sarah Bellini	Nutrition, Dietetics, and Food Science	Life Sciences
Dr. Neil Peterson	Nursing	Nursing
Dr. Laura Jefferies	Nutrition, Dietetics, and Food Science	Life Sciences

Track 2 - $20,000 per year for two years

Abstract

Historically, lifestyle management (e.g., healthy diet) has been the foundation of obesity treatment. Recently, glucagon-like peptide receptor agonist (GLP1) medications (e.g., semaglutide) have emerged as more effective tools to manage obesity than lifestyle alone. Yet many health professionals are adamant that lifestyle remains central for obesity treatment and overall health. As anti-obesity medications are new, how they interact with important components of lifestyle (e.g., dietary intake), is not yet fully understood. For example, one theory posits that semaglutide reduces food noise (excessive preoccupation with food) and makes it easier to eat a healthy diet. While an intriguing idea, this is not yet known. Further, the landscape of anti-obesity medications is rapidly evolving. Last December the FDA approved an oral pill version of semaglutide (Wegovy®); however, there is little examination about this oral version interacts with lifestyle. This is clearly a fertile area for research.

Using a double-blind and randomized-controlled study design, we will examine how oral Wegovy® influences subsequent fruit and vegetable intake, other correlations of diet and eating, and body composition in adults with obesity over 16 weeks. Group 1 (n=25) will receive oral Wegovy® and a recommendation to consume at least five fruits and vegetables per day. Group 1 will receive the recommended schedule and dosage for oral Wegovy®. Group 2 (n=25) will receive a placebo and a recommendation to consume five fruits and vegetables per day. Primary outcomes include, weekly fruit and vegetable consumption, food noise, neural food cue responsiveness, dietary intake, sweet preference, hunger, and body composition.

Summary of Plans for External Funding

We will utilize a variety of resources including Pilot and The College of Life Sciences Office of Research development to identify industry, government (e.g., NIH), and foundation granting agencies and apply for relevant external grants. As medications are likely to be a strong focus of obesity treatment for the foreseeable future, we believe this study will initiate many related studies in the future.

Importantly, this project will provide student training opportunities in cutting-edge research, study coordination and methodologies, and experience with state-of-the-art technologies in electroencephalogram and diet-related assessment.

PROJECT NARRATIVE

INTRODUCTION

Overview. Over 40% of U.S. adults are living with obesity (1). Glucagon-like peptide receptor agonist (GLP1) medications using semaglutide have recently emerged as an effective tool to manage obesity and improve cardiometabolic outcomes (2). Specifically, semaglutide medications significantly reduce body weight (3). Common mechanisms noted in the literature include, 1) reduction in hunger, and 2) delay of gastric emptying (4). Until this year, the most common brand of semaglutide has been injectable Wegovy®. On December 22, 2025, the U.S. Food and Drug Administration approved an oral pill version of Wegovy®. The oral pill version of Wegovy® appears to have similar weight loss outcomes to injectable Wegovy® (3). However, there are differences in cost, dosage, and bioavailability. Furthermore, virtually no research is available that examines the effects of oral Wegovy® for important dietary and food intake correlates to weight management. Understanding their effects is cutting-edge and has important implications for future combination treatments that incorporate both semaglutide and lifestyle. Therefore, the purpose of this study is to examine the effect the oral Wegovy® on important correlates of diet and weight management. There are at least two reasons this study is novel.

- First, it is unclear how oral Wegovy® influences subsequent lifestyle behaviors; specifically, diet composition, diet quality, and other factors that could affect food intake. In other words, while energy intake is clearly reduced with semaglutide, it does not necessarily follow that the diet is healthy. Without a proper diet, individuals taking Wegovy® may not benefit fully. One theory posits that semaglutide reduces food noise (excessive preoccupation with food) which may assist some individuals to effectively plan for and develop better eating patterns (5). However, research in this area is lacking. Moreover, understanding the interplay between oral Wegovy® and correlates of eating will inform future research on the optimal combination of Wegovy® with dietary intake (and other lifestyle factors) for health.
- Second, while there is growing research on the effects of injectable Wegovy®, there is sparse research on the effects of the oral pill version of Wegovy®.

The efficacy and production of GLP1 medications is arguably the most significant development in obesity treatment in recent history and will likely evolve to be the central focus of weight management treatment going forward. As such, researching the interactive effects of these drugs and lifestyle are essential to maximize the health of individuals seeking treatment for obesity. This research is fertile ground for external grants.

Background. Obesity, defined as a body mass index of 30 kg/m^2 or higher, has emerged as one of the most significant public health issues in modern society (6). More than 40% of U.S. adults are currently living with obesity (1,7). Obesity negatively influences metabolic health (8), psychosocial health (9), and quality of life (10).

Studies of weight loss among individuals with obesity are consistently correlated with improvements in cardiometabolic health (11,12), health-related quality of life, and lifespan (13). However, traditional methods of treating obesity, such as diet, exercise, and behavior change, are difficult to sustain long-term; thus, weight loss maintenance is difficult for many individuals (14). The near ubiquitous weight regain following weight loss has highlighted the role of physiology in weight management (15) and has caused health care providers, researchers, and

drug companies to continuously look for better ways to manage body weight long-term, including through pharmacological methods.

Over the last several years, injectable Wegovy (i.e., semaglutide) has emerged with breakthrough results for obesity treatment (16,17). Recent studies have shown ~15% body weight loss (2,3,18); more than double the weight loss expected from diet and exercise alone (19). Semaglutide sensitizes pancreatic beta cells to release insulin, acts on brain centers to reduce hunger, delays gastric emptying resulting in a feeling of fullness longer, and improves cardiometabolic outcomes (4,17). The success of GLP1 medications has been well-publicized by news and media outlets particularly noting the social and medical aspects of GLP1 medications (20). While there remain important questions and concerns about these medications (e.g., what happens once a person goes off the medication, how is lean mass affected (21), what is the interplay of diet and exercise with these medications (22), how to bring down costs, psychiatric safety (23), etc.), initial data suggest these medications have relatively minor adverse effects (e.g., diarrhea, nausea, constipation) (24) that tend to resolve with time (17). Thus, many health care providers are willing to prescribe these medications, and many patients are willing to use them.

The oral version of Wegovy® was approved in December of 2025. The primary study examining this medication was published in the *New England Journal of Medicine* in September of 2025 (3). In this study, Wharton et al. showed that a 25-mg daily dose of semaglutide reduced body weight by 13.6% over 64 weeks and was associated with improvements in physical functioning (3). Compared to placebo, gastrointestinal adverse events were higher with the medication (3).

Short and Long-Term Objectives. This study will address several unknowns about oral Wegovy®. Specifically, the objectives of this study are:

- To determine effects of 16 weeks of oral Wegovy® on dietary quality, as indexed by fruit and vegetable intake, food noise, neural food cue responsiveness, overall dietary intake, sweet preference, and hunger compared to placebo. Body composition will also be assessed.
- To provide mentored research opportunities for undergraduate students to develop expertise in clinical trial management, neurophysiological data collection, and metabolic assessment.

PROPOSED PLAN

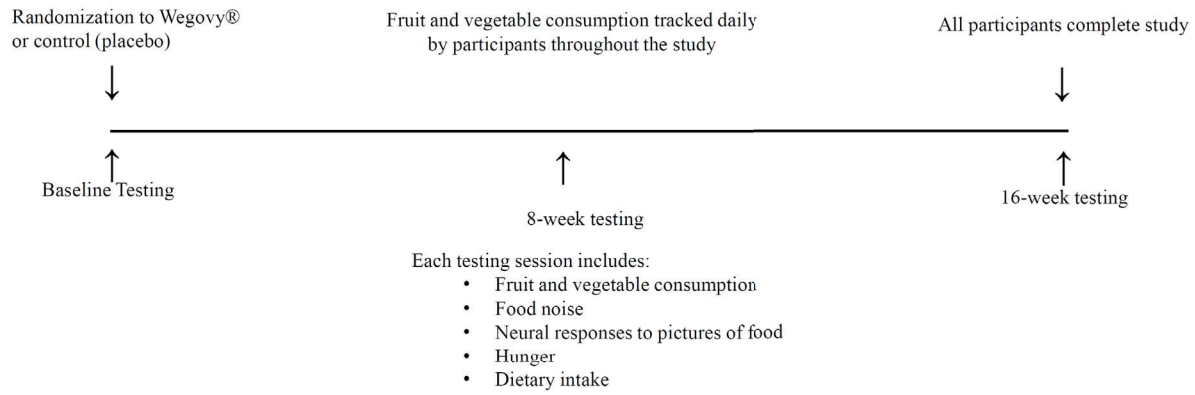
Participants and Study Design. This study will receive Institutional Review Board approval prior to initiation. Participants will be women 18-55 y, have a BMI of 30 kg/m^2 to <40 kg/m^2 (class I and II obesity), and a willingness to participate in the study with or without receiving oral Wegovy®. To control for sex differences, only women will be used in this study. Participants will be excluded from the study for one or more of the following reasons: use of tobacco products, pregnant or lactating, peri- or menopausal, recent weight change (±5 lbs over previous 6 months), recent change in medication use or dosage (previous month), or metabolic disease (e.g. heart disease, cancer, diabetes, etc.).

We propose a two-group, double-blind and randomized-controlled study of 50 participants with class I/II obesity over 16 weeks. Group 1 (n=25) will receive oral Wegovy® at recommended doses and a recommendation to consume at least five fruits and vegetables per day. Group 2 (n=25) will receive a placebo a recommendation to consume five fruits and vegetables per day. To ensure double-blinded procedures, vials will be relabeled with codes by the Nursing Learning Center, which is experienced in labeling medicines. The Nursing Learning Center will retain the

master list of codes and which group they apply to. The contents of the medication will remain blinded to participants and research assistants.

Procedures. Each participant will be screened to confirm she meets the criteria for the study and will provide informed consent prior to initiation of the study. Figure 1 below shows the participant treatment and testing schedule. Participants will receive a two-month supply of oral Wegovy® or placebo at each laboratory session. During baseline testing, each participant will be trained to self-administer the medication. In addition, each participant will be asked to consume and track at least five fruits or vegetables each day. Practical advice for fruits and vegetables will be provided by a student in dietetics at the baseline testing session and after 8 weeks. No other advice on eating will be provided. Prior to each laboratory session, participants will report to the laboratory in the morning (6-9am) after fasting.

Figure 1. Treatment and Testing Schedule.



Medical Oversight. Medical oversight for this study will be provided by Dr. Neil Peterson, a Nurse Practitioner (NP) and Associate Professor at BYU. Dr. Peterson has had significant previous experience administering obesity medications and addressing related concerns of patients. Dr. Peterson will evaluate each participant prior to acceptance into the program, recommend and instruct each participant in the proper administration of oral Wegovy®, and provide ongoing support throughout the study as needed. Dosage of oral Wegovy® will be according to the following recommended schedule: 1.5mg daily during weeks 1-4, 4mg daily for weeks 5-8, 9 mg daily for weeks 9-12, and 25 mg daily for weeks 13-16.

Fruit and Vegetable Tracking. Participants will be asked to consume at least five fruits and vegetable each day and track consumption each day. Participants will report intake confidentially each week.

Food Noise. Diktas et al. noted that patients describe food noise as, "…the experience of having a constant inner dialogue about food and a continuous flux of food-related thoughts that include thinking about what to eat, how much to eat, and when to eat again" (25). To assess food noise, we will utilize the validated Food Noise Questionnaire (25).

Body Height, Weight, and Composition. Body weight will be obtained using a digital scale (nearest 0.01 kg) height using a wall-mounted stadiometer (nearest 0.1 cm), and body composition using dual-energy x-ray absorptiometry (DXA) which has been shown to be valid and reliable (26). For safety, DXA has institutional medical oversight from BYU and all users of

the DXA will be certified through the state to administer the machine. In addition, all participants will receive a negative pregnancy test prior to DXA training.

Food Cue Response. Electroencephalogram (EEG) will be used to assess food cue responses and inhibitory control in this study. EEG data will be recorded from 128 scalp sites using a geodesic sensor net and an Electrical Geodesics, Inc. (EGI; Eugene, Oregon) amplifier system (20K gain, nominal bandpass = 0.10-100 Hz), with electrode placements enabling the recording of vertical and horizontal electro-oculographic (EOG) activity. Event-related potentials (ERPs) will be extracted to examine neural responses to food stimuli, allowing for the assessment of food-related reward processing and inhibitory control, and how these neurophysiological measures change with medication versus control conditions.

Pictures (Stimuli) Food-Related Inhibitory Control (Go/ No Go Task of Inhibition*)*. During the first Go/No Go task of inhibition, each participant will be shown 100 pictures (30 high-calorie and 70 low-calorie) of food in random order for 100 ms with an inter-trial interval of about 300-800 ms (27). E-prime will be used to present pictures. During this task, participants will respond to each food picture by pressing a specified button on a keyboard (Go/No Go task). Specifically, each participant will press a button on a keypad with a right index finger when presented with a picture of a low-calorie food and will withhold pressing the button when presented with a picture of a high-calorie food.

Sweet Taste Preference*.* To test sweet taste preference, the Monell 2-series forced choice test will be utilized (Monell Chemical Senses Center, Philadelphia, PA 19104). The Food Sensory Lab on BYU's campus (S103 Eyring Science Center, Provo, UT 84602) is well equipped to administer this test. Dr. Jefferies, who directs the BYU Sensory Lab, will oversee the administration of this test. In short, the Monell test is an established and validated protocol (28) to determine sweet preference.

Hunger. Hunger will be self-reported before and after each meal throughout the study. We will use a simple app that allows online reporting of hunger using a visual analog scale (VAS). VAS is a 100 mm scale with the terms "not at all" on the left and "extremely" on the right. The participant marks along the continuum the present level of hunger which can be quantified on a scale of 0-10. VAS is a research-grade and a common tool to determine hunger (29).

Dietary Intake. Dietary intake will be assessed using the ASA24 online 24-hour dietary recall developed by the National Cancer Institute (30). Using a computer or iPad, the ASA24 system requires each participant to input all food or beverages consumed during the previous day. To increase accuracy of reporting, the ASA24 program provides a drop-down menu of foods and pictures of serving sizes. Each participant will be instructed to enter all food and beverages consumed for the previous day. This will be repeated prior to the program, and after two and four months. This software is considered highly feasible and a good prediction of diet (30).

Power Analysis*.* Using a repeated measures within-between group interaction F test, a small effect size (0.20), alpha level of <0.05, two groups, four repeated measurements, and a correlation of 0.7, 42 participants are needed for 95% power (21 per group). This study will recruit and budget for 50 participants accounting for the possibility of dropout.

Statistical Analysis. Data will be analyzed using SAS version SAS® (Version 9.4, Carey, NC). Means and standard deviations will be reported and alpha will be set at $p<0.05$. Mixed model analysis will be utilized to test for group (oral Wegovy® vs. placebo) by time (baseline, 8 weeks,

16 weeks or weekly for fruit and vegetable consumption) interactions with appropriate statistical controls (e.g., age). The primary outcome measure for EEG will be the amplitude of the waveform difference between groups and between go and no-go trials over time. Thus, for EEG analyses, group, time, and inhibition condition will be factors.

How Project will Increase Competitiveness for External Funding. This study has clinical and research implications well-suited for a variety of grant funding agencies. The novelties of this study will be to better understand correlates of diet and food intake in the context of oral Wegovy®. We anticipate this study will provide excellent pilot data to develop hypotheses and show capability in doing research in this area.

Description of Team.

Dr. James LeCheminant has extensive experience in clinical weight management (>90 scientific papers), conducting interventions, and administering the outcomes assessed in this study. His role will be to coordinate and oversee all aspects of this study.

Dr. Michael Larson is a licensed clinical neuropsychologist and cognitive neuroscientist with expertise in inhibitory control, neurophysiological assessment, and obesity-related cognition. As the director of the Clinical Cognitive Neuroscience and Neuropsychology Lab at Brigham Young University, he brings extensive experience in EEG methodology, behavioral assessment, and clinical trial design. In this study, Dr. Larson will oversee neural data collection and analysis, contribute to study design and methodology, and mentor graduate and undergraduate researchers.

Dr. Sarah Bellini is a registered dietitian nutritionist with clinical and research experience in dietary assessment and body composition analysis. She is the director of the undergraduate dietetics program and chaired several graduate committees.

Dr. Neil Peterson is Nurse practitioner with extensive clinical and research experience in physical activity and sedentary behavior. Dr. Peterson has experience working with patients living with obesity and administering GLP1 medications. Dr. Peterson's work is highly interdisciplinary, including exercise science; public health; social work; CAPS; environmental and occupational health; nutrition, dietetics, and food science; and cell biology and physiology.

Dr. Laura Jefferies is an Associate Professor of Food science with expertise in sensory studies protocol and has conducted and supervised over 1500 food acceptance panels using human subjects. She is the faculty supervisor of the BYU Sensory Laboratory, teaches the senior course Techniques of Sensory Analysis, and is the senior author of peer-reviewed journal articles on sensory study methodologies. Dr. Jefferies's will mentor undergraduate student research assistants in the preparation the sweet preference protocol and analyzing data.

Obesity is a complex and interdisciplinary disease. The team assembled for this IDR highlights the important role of the combination of expertise in health-care, diet, food sensory, and neural health to address the problem. We anticipate continued (and extended) collaborations among this group as we continue to learn about the role of diet, food, and exercise in the new age of obesity medications.

Expected Milestones and Research Outcomes

May-Sep, 2026	Oct-Dec, 2026	Jan-June, 2027	July-Dec, 2027
-Submit Institutional Review Board application -Order medications -Provide written report -Oral report at University networking activity during University Conference Week	-Train student RAs -Pilot test 2 participants -Begin recruiting	-Data collection for 50 participants	-Analyze, submit for presentation, submit for publication -Provide final written report -Oral report at University networking activity during University Conference Week