use regression to model associations of percent DNAm at gene loci of interest on GRASP percentile, controlling for relevant covariates (e.g., age, sex). RESULTS/ANTICIPATED RESULTS: Final data collection, cleaning, and analysis are in progress and on target to be completed in Fall 2025. We will present final results of these analyses, including descriptive characteristics of the sample (e.g., summary and frequency statistics) and overall DNA methylation patterns (e.g., b or M values as appropriate), and whether there is support for our hypotheses that children with greater prenatal family and community exposures will have DNAm in pertinent genomic regions related to energy regulation or fat deposition (e.g., regression parameters and confidence intervals). DISCUSSION/SIGNIFICANCE OF IMPACT: Findings will advance knowledge of early-life physiologic effects of exposures during pregnancy. Future clinicians may use this knowledge to earlier identify and treat children at high risk for adverse child metabolic health outcomes such as obesity, and health advocates can use it to promote policies to reduce adverse prenatal environments.

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Development of a pediatric obesity treatment using a Sequential Multiple Assignment Randomized Trial (SMART) design

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OBJECTIVES/GOALS: Pediatric obesity is a public health issue. Many youths in lifestyle obesity treatments do not improve their weight. Sequential Multiple Assignment Randomized Trial (SMART) study designs can support slow responders (e.g., youth who do not initially lose weight). SMARTs have limited use in pediatric obesity and lack data-driven adaptive rules. METHODS/STUDY POPULATION: This study leveraged an ongoing 6-month family-based health behavior pediatric obesity treatment for children and their parents. Parents with obesity and their children (6–11years) with overweight/obesity (body mass index >85th%ile) who lived in rural areas and were a part of the larger pediatric obesity treatment trial were invited to this study. During the treatment, parent/child dyads were asked to complete additional surveys across nine time points (weeks 1, 2, 3, 4, 6, 8, 12, 16, and 20). Surveys assessed the child's physical activity, diet, and pain, along with the family environment and parental stress. The child's anthropometrics were measured each month. RESULTS/ANTICIPATED RESULTS: Data collection will be completed in December 2025. Anticipated results will include analyses to identify responders (i.e., children who reduce their weight outcomes [body mass index (BMI) z-score, BMI percentile, or weight]) and slow responders (i.e., children who do not reduce their weight outcomes) to the pediatric obesity treatment; based on preliminary work, we expect ~50% of the sample to be responders. Once responders/slow responders are identified, survey data will be used to define the adaptive rules, including the tailoring variable (e.g., physical activity or junk foods, or early-response weight outcomes) and decision time point for second randomization. DISCUSSION/SIGNIFICANCE OF IMPACT: Data from this study will lay the groundwork for developing data-driven criteria for SMART rules (tailoring variable and decision time point for second randomization). This, in turn, will support the development of adaptive interventions to identify and support the many youths who are slow responders to lifestyle pediatric obesity treatments.

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A systematic review of medication adherence, risk factors, and implications for novel hypertension therapies

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OBJECTIVES/GOALS: This study aims to identify socioeconomic, clinical, and behavioral risk factors of non-adherence for adults with hypertension and evaluate implications for future treatment strategies. METHODS/STUDY POPULATION: We will conduct a systematic review following PRISMA guidelines. Eligible studies are peer-reviewed RCTs and observational designs assessing factors associated with antihypertensive medication adherence among adults (≥18 years) with hypertension living in North America or Europe. Studies must report adherence as the primary outcome. Studies will be excluded if they are not peer-reviewed, original research articles, published in a non-English language, reviews or meta-analyses, or studies of an intervention aimed at improving adherence. Abstract and title screening, full paper review, and data extraction will be performed in Covidence by two reviewers with conflicts resolved by consensus. RESULTS/ANTICIPATED RESULTS: A total of 5660 records were imported for screening after duplicate removal. Following title and abstract screening, 4990 studies were excluded as irrelevant, leaving 670 records for full-text review. Of 611 full texts reviewed, 491 studies were excluded and 39 are pending conflict resolution. Currently, 119 studies are marked for data extraction. Data to be extracted will include socioeconomic, demographic, clinical, and behavioral determinants of antihypertensive medication adherence. Quality assurance will involve dual independent extraction. Preliminary trends suggest wide variability in study designs and adherence definitions across North American and European populations. DISCUSSION/SIGNIFICANCE OF IMPACT: Findings will clarify key predictors of antihypertensive medication non-adherence and highlight gaps in evidence. Results will guide future adherence-improving strategies and inform design of simplified regimens, digital tools, and population-specific hypertension management policies.

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