

Self-Managed Energy Assistance Pre-Analysis Plan August 17, 2026

Study Design Overview

The objective of this randomized controlled trial (RCT) is to evaluate whether a self-managed Low Income Home Energy Assistance Program (LIHEAP) delivery model reduces energy insecurity. Traditional LIHEAP delivery provides a one-time, lump-sum payment directly to a utility company. This intervention modifies that process by allowing recipients to control their benefit allocation through an Energy Savings Account (ESA) and strategically pay their bills at an increment of their choosing.

The study aims to answer the following primary research question: **Does giving LIHEAP recipients control over when and how their benefits are applied reduce energy insecurity compared to the traditional one-time, lump-sum delivery?**

The research will be conducted during the 2026-2027 heating season in the Quad Cities region of Illinois (Henry, Mercer, and Rock Island counties). The study will enroll 1,000 households, with 500 assigned to the treatment group (ESA) and 500 to the control group (traditional LIHEAP). Data will be collected through two longitudinal participant surveys (baseline at enrollment, end of heating season), as well as administrative utility data and financial transaction records.

The Self-Managed Energy Assistance (SMEA) project is led by Principal Investigator David Konisky from Indiana University, in coordination with Co-PIs Christopher Knittel (MIT), Sanya Carley (University of Pennsylvania), Roger Pavey (Illinois Association of Community Action Agencies), and Harris Levine and Nate Bernard (Ker-twang). This interdisciplinary research team works in close partnership with Project NOW, the local community action agency responsible for LIHEAP administration and participant enrollment in the Quad Cities region. Other project partners include the Illinois Department of Commerce and Economic Opportunity (DCEO), which provides LIHEAP benefits and administrative data; MidAmerican Energy, which provides utility usage and billing data; and Ascendra Credit Union, which hosts the Energy Savings Accounts (ESAs) used by the treatment group.

Sampling Approach and Identification

The study aims to enroll a target sample of 1,000 households, divided equally into 500 treatment participants (ESA group) and 500 control participants (traditional LIHEAP). Participants are identified through the standard LIHEAP application process at Project NOW in the Quad Cities region. To ensure the treatment and control groups are balanced, the study utilizes stratified randomization based on three key characteristics: poverty level (by federal poverty level tiers), race/ethnicity, and age.

To be eligible for the RCT, an applicant must meet several technical and financial requirements:

- Must be eligible for LIHEAP and have MidAmerican Energy as their primary utility provider.

- Must report a monthly household income of at least \$300 and utility arrears of less than \$300.
- Must have a smartphone or internet connection capable of making online bill payments.
- Must possess a Social Security Number (SSN) or Individual Taxpayer Identification Number (ITIN), which is a requirement for opening the Ascentra Credit Union account.
- Applicants are excluded if they face a current utility disconnection, use delivered fuels like propane, have specific "Revenue Protection" charges on their utility account, or are staff members at Project NOW.

Subject enrollment is embedded directly into the regular LIHEAP intake process for the 2026-2027 LIHEAP season, which begins in October 2026. The research team aims to have 500 intervention-active participants by November 15, 2026.

Participants are compensated for each survey that they complete as well as for an onboarding session for those in the treatment group to learn how to use their ESA.

Participants will take two surveys. The first is a baseline survey, in advance of any treatment. This survey is administered during the initial application/enrollment phase. The second survey will be administered 6-months after the treatment period, near the end of the heating season. Participants will be invited to take this survey via text and email (with telephone assistance if needed).

Hypotheses

Confirmatory Hypotheses We hypothesize that LIHEAP recipients with control over their benefits (treatment group) will:

- Experience lower utility disconnection rates compared to the control group.
- Less frequently trade off energy bill spending for other essential household expenses, such as food or medication.

Exploratory Hypotheses Additionally, we anticipate that recipients with benefit control will:

- Reduce or smooth their energy consumption over the study period.
- Accrue less energy utility debt (arrearages).
- Feel more in control over their energy bill

Measures and Index Construction

Dependent Variables

- **Utility Disconnection Rates:** Measured as a binary variable (disconnected/not disconnected) representing any service interruption for non-payment during the approximately 6 months post-randomization. This is sourced from both utility data and participant surveys.
- **Energy-Related Spending Tradeoffs:** A binary measure indicating if a household reduced or forwent other necessities to pay an energy bill. This is a primary outcome measured via participant surveys.

- **On-Time Bill Payment Rates:** Calculated as the proportion of monthly bills paid by or before the due date, obtained directly from the utility provider.
- **Total Energy Consumption:** Monthly consumption measured in kWh, obtained directly from the utility provider.
- **Total Arrearages:** The cumulative unpaid balance on utility accounts at the end of the study period, obtained directly from the utility provider.
- **Energy Insecurity Measures:** Constructed from survey responses regarding thermal comfort, financial stress, and bill-balancing behaviors.
- **Energy Bill Control:** Constructed from survey responses to a question about whether the respondent feels in control of their energy bill.

Independent Variables

- **Treatment Assignment:** A binary variable where 1 represents the treatment group (ESA recipients) and 0 represents the control group.

Control Variables

The main models will contain no control variables, since the randomization process should ensure that the control and treatment groups are balanced. But we will also include robustness checks in our analysis in which we include several variables that may shape energy outcomes.

- **Demographics and Poverty Level:** Sourced from LIHEAP application data, including household size, income (as a percentage of the federal poverty level), race/ethnicity, and age.
- **Historical Utility Data:** Previous energy consumption, historical LIHEAP participation, and prior disconnection history.
- **Priority Status:** Whether the household is considered a priority applicant (e.g., elderly, disabled, or having children under age 5).

Estimation Procedure

We will employ regression analyses to estimate the Average Treatment Effect (ATE). The general model takes the following form:

$$Y_i = \alpha + \beta T_i + \epsilon_i$$

where Y_i represents the outcome of interest (e.g., energy insecurity indicator or usage), T_i is the randomized treatment assignment, β is the parameter representing the treatment effect, and ϵ_i is the error term.

For binary dependent variables, we will estimate the model using Ordinary Least Squares (OLS) as a linear probability model. For those model specifications that use binary or ordinal variables as the dependent variables, we will estimate logit and ordered logit models.

We will also estimate OLS models to identify heterogeneous treatment effects for age, race, income levels, and children in the home. These analyses will be exploratory since the design will likely be underpowered for these types of analysis.