

DECREASING ENERGY COSTS IN FEDERALLY ASSISTED HOUSING

Sending flyers with energy-saving tips did not change energy use

Target a Priority Outcome The Department of Housing and Urban Development (HUD) spends more than \$1 billion per year on public housing utility costs for heating, lighting, and cooling.¹ In turn, these costs affect HUD programs. HUD seeks to encourage residents of Federally assisted public housing developments to reduce household energy use, thereby reducing Federal expenditures on public housing utilities.

Translate Evidence-Based Insights OES and HUD collaborated to pilot test the feasibility of sending public housing residents flyers with a single or multiple energy-saving tips as a means of reducing energy use. Residents may be willing to engage in conservation behaviors, but may not know what actions will be effective or what steps to take to reduce energy use. Providing residents with a single tip may reduce energy use by identifying a straightforward action plan and avoiding information overload.^{2,3} Alternatively, providing multiple tips may reduce energy use by helping residents find and take the actions that are easiest for them personally and making conservation feel more easily achievable.^{2,4}

OES and HUD developed flyers with either one or

¹ U.S. Department of Housing and Urban Development. *Progress Report and Energy Action Plan Report to Congress, Section 154, Energy Policy Act of 2005* (2012), <https://www.hud.gov/sites/documents/OSHCENERGYREPORT2012.PDF>

² Jocelyn J. Bélanger, Noa Schori-Eyal, Gennaro Pica, Arie W. Kruglanski, and Marc-André Lafrenière, "The 'more is less' effect in equifinal structures: Alternative means reduce the intensity and quality of motivation," *Journal of Experimental Social Psychology* 60, (2015): 93-102.

³ Szu-chi Huang and Ying Zhang. "All roads lead to Rome: The impact of multiple attainment means on motivation," *Journal of Personality and Social Psychology* 104, no. 2 (2013): 236-248.

⁴ Arie W. Kruglanski, Antonio Pierro, and Anna Sheveland, "How many roads lead to Rome? Equifinality set-size and commitment to goals and means," *European Journal of Social Psychology* 41, (2011): 344-52.

five energy-saving tips. The single-tip flyer included the tip, "Turn off AC when not at home." The additional tips on the five-tip flyer were, "Use fans instead of AC to stay cool," "Open windows when it's nice outside," "Close windows when it's hot outside," and "Close drapes and blinds on hot sunny days." Both flyers were printed in English on one side and Spanish on the reverse.

Embed Tests The flyers with either one or five energy-saving tips were mailed to a sample of housing units at seven New York City Housing Authority (NYCHA) developments in early September 2017. These units were randomized within blocks based on development and bedroom size (studio - five bedrooms) into either a no-flyer, single-tip flyer, or multiple-tip flyer group. Single-tip flyers were mailed to 935 units and multiple-tip flyers were mailed to 932 units. No flyers were mailed to 929 units. Average daily energy use (in kilowatt-hours, kWh) for units sent flyers was compared to average daily energy use for units not sent flyers.

Analyze Using Existing Data About 5,000 NYCHA housing units have been retrofitted with Wireless Energy Modules (WEMs) that record indoor temperature and daily energy use. WEMs recorded unit-level daily energy use for 2,796 units prior to randomization in July 2017. The outcome period was two weeks in mid-September following expected receipt of the flyers. The sample includes 2,514 units with 11 or more days of energy use data during the outcome period.⁵ Average daily energy use recorded by WEMs during the outcome period was compared for units sent no flyer to units sent a flyer with a single or multiple energy-saving tips. All comparisons controlled for mean baseline

⁵ Rates of missing data did not differ between units not sent a flyer and units sent a single-tip or multiple-tips flyer.

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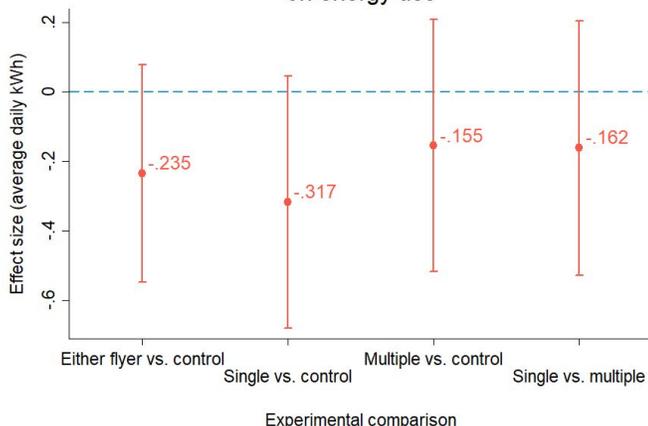
energy use during a two-week period in late August and early September 2017 and assignment block fixed effects (42 development--bedroom combinations).

Reanalyzed Results The results that follow are reported both without adjusting for multiple comparisons and adjusting for multiple comparisons using the Holm-Bonferroni family-wise error rate. Units sent flyers with either a single tip or multiple tips used less energy per day during the two weeks following expected receipt of the flyers compared to units not sent flyers, although the difference was not statistically significant. On average, energy use for the control group was 16.88 kWh per day; those sent the single-tip flyer used 16.56 kWh per day, and those sent the multiple-tip flyer used 16.72 kWh per day.

multiple-tip flyer and control (-0.155 kWh per day, $p=0.40$, 95% CI [-0.52, 0.21], Holm-Bonferroni-corrected $p=0.77$), and between single-tip flyer and multiple-tip flyer (-.162 kWh per day, $p=0.39$, 95% CI [-0.53, 0.20], Holm-Bonferroni-corrected $p=0.77$) also were not statistically significant. Figure 1 shows the point estimate and confidence interval for each effect.

Build Evidence This pilot demonstrated the feasibility of sending flyers with energy-saving tips as a strategy to reduce energy use among public housing residents. Residents in public housing units that were sent flyers with energy-saving tips, particularly a single tip, used less energy afterwards than residents in units that were not sent flyers; however, reductions were small, imprecisely estimated, and not statistically significant. Future work will build on this study to examine how informational communications can have greater impact on energy use and costs.

Figure 1: Effects of flyers with energy-saving tips on energy use



Energy use among units sent any flyer (single- or multiple-tips) was 0.235 kWh per day lower than units in the control group, but this difference was not statistically significant ($p=0.14$, 95% CI [-0.55, 0.08], Holm-Bonferroni-corrected $p=0.42$). Differences between the single-tip flyer and control (-0.317 kWh per day, $p=0.08$, 95% CI [-0.68, 0.05], Holm-Bonferroni-corrected $p=0.35$),