

Increasing Property Values and Decreasing Forced Mobility: Analysis of Nonenergy Benefits for Low-Income Programs

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ABSTRACT

In 2009 an evaluation of People Working Cooperatively's (PWC) weatherization, home repair, and mobility modification services examined a number of nonenergy benefits accrued by participants, utility sponsors, and the community at large.

The evaluation examined: improved comfort; improved health; reductions in health and safety risks; reductions in forced mobility; and stress reductions for people receiving services. Benefits were measured using one- to two-hour in-home interviews with 15 participating households and through a survey of 200 randomly selected participants.

Compared to higher-income customers, low-income households tend to move more frequently. By addressing basic maintenance issues and high energy consumption, PWC's services strive to help these customers remain in their homes. Reductions in forced mobility benefit both participants and society. This evaluation tested school performance changes for highly mobile students. Analyzing Ohio Department of Education data compared more mobile students to those remaining in the same school. Students frequently moving and those in schools with highly transient populations scored less proficiently on standardized aptitude tests.

By examining county auditor data, we assessed PWC services' impacts on participating homes' property values. Our model analyzed PWC-served homes' sales prices against properties not served and neighboring. The model considered common housing characteristics, years sales occurred (to account for other market characteristics, such as the general economy), and neighborhood characteristics.

People Working Cooperatively's History and Goals

Since the mid-1970s, People Working Cooperatively (PWC), a nonprofit organization based in Cincinnati, Ohio, has provided services to low-income, elderly, and disabled homeowners in Ohio, Kentucky, and Indiana. PWC's licensed, trained professional staff provide critical home repair, weatherization, and maintenance services, and educate homeowners on methods to care for their homes. Additionally, PWC's volunteer teams assist clients with yard cleanup and routine home maintenance. PWC ultimately seeks to enable homeowners, regardless of their age or ability, to remain in their homes, while maintaining a habitable, safe environment.

In 2009, PWC provided 6,000 households with over 11,500 services. The organization receives a \$10.8 million budget from an array of sources, including: utility companies, state and local governments, private foundations, and individual donors. PWC does not receive federal dollars to implement the Weatherization Assistance Program (WAP), nor does it receive health and safety dollars from the Low Income Home Energy Assistance Program, which many other agencies use to conduct similar work in their communities.

PWC maintains a staff of over 100 people, many being professional, licensed contractors. PWC staff have a long-term roots in the communities they serve, recruiting over 5,000 volunteers in 2009. Utilizing this diverse funding and labor, PWC applies a “whole-house” approach to serving families, including thoroughly assessing a home’s entire needs (such as a home’s energy consumption, major and minor repair needs, and any mobility modifications necessary for elderly or disabled residents).

2009 Evaluation

In 2010 and 2011, the Cadmus Group, Inc. (Cadmus) and the Economics Center for Research and Education at the University of Cincinnati (Economics Center) evaluated PWC’s 2009 program efforts. We reviewed potential program participation benefits from three perspectives: participants’, utilities’, and society’s. Table 1 lists potential program benefits the evaluation was expected to address.

Table 1. Potential Benefits of PWC Program Activities

Participant
Utility bill savings.
Improved knowledge of home and home maintenance.
Increased mobility independence.
Increased safety and security in the home.
Increased comfort.
Improved health.
Decreased hardship and stress.
Improved property values.
Decreased forced mobility and homelessness.
Utility/Ratepayer
Energy and demand savings.
Avoided utility costs.
Avoided utility rate subsidies.
Reduced costs associated with shutoffs and disconnections.
Improved customer payment patterns.
Reduced collection costs.
Society
Reduced energy use.
Improved school performance.
Decreased community health care expenses.
Increased property values.
Local economic benefits.
Reduced greenhouse gas emissions.

Table 2 details data collection activities the team used in evaluating PWC’s 2009 programs.

Table 2. Data Collection Efforts

Evaluation Activities	Source/Status
PWC database analysis	Review of services provided to 2009 participants.
Participant on-site interviews	One-and-a-half to two-hour interviews with participants receiving whole-house work (n=15).
Staff, board, and volunteer interviews	Interviews with staff (n=12), board members (n=3), and long-term volunteers (n=3). Interviews focused on program goals, review of program operations, opportunities for improvements, and satisfaction with PWC as an organization and with its programs and objectives.
Participant surveys	Surveys of a randomly selected participant group (n=200).
Billing and customer payment behavior analysis	Census of 2009 participants and a comparison group. Analysis in progress; data received from Duke Energy in May 2011.
Secondary data	Review of hundreds of low-income studies.
Property values assessment	Analysis of Hamilton County Auditor data on homes sold from 2000–2010
Student mobility analysis	Analysis of Ohio Department of Education data on building- and district-level student performance.

Property Values

Data and Methodology

Previous research indicates that the maintenance and condition of a home impact property values (Davidoff, 2004; Des Rosiers et al., 2002; Harding et al, 2007; Knight et al, 2000). To assess PWC’s weatherization and home repair services impacts on property values, our team examined Hamilton County Auditor data on 7,400 valid, single-family home sales in the City of Cincinnati, from 2000 through April 2010. Using the entire decade (to date) allowed identification of housing bubble and bust impacts, mitigating bias introduced by focusing on either economic peak. Additionally, as all properties were located within the same geographic region, we assumed they were subject to the same demand conditions, such as buyer profiles and finance availability. Within this dataset, specific properties could be identified that, since 2000, received PWC repair and/or weatherization services prior to the property’s sale.

The model analyzed a property’s sale as a function of the following: housing characteristics (total number of rooms, total number of bathrooms, garage spaces, acreage, finished square feet, and physical condition); year of sale (accounting for other environmental characteristics, such as the general economy); and neighborhood identifiers. When including neighborhood identifiers, strong connections were assumed between properties in a given jurisdiction; simply identifying the jurisdiction provided a reasonable proxy for the area’s remaining, unobservable characteristics.

The model also included a variable identifying sold properties receiving PWCs services prior to sale. PWC recipients accounted for a very small proportion of the entire sample (about 1 percent).

After identifying individual PWC recipients within the total sample, PWC and non-houses were aggregated by neighborhood, providing a count of non-PWC client homes located in the same neighborhood (although not necessarily adjacent properties). Due to the sample's small proportion of PWC homes, each non-PWC home had less than one surrounding property treated by PWC. Additionally, no more than four PWC participants surrounded a given non-PWC home in any year. While the dataset had a relatively small number of PWC clients, their homes were in proximity to a significant number of additional households. This implies PWC's reach potentially extends far beyond its clients.

Results

After considering identified, relevant factors, analyses indicated property conditions played an important role in determining a home's value. Table 3 contains PWC work's estimated impacts on home sale prices.

Table 3. Percentage Impact of PWC's Work on Sale Prices

Variable	Percentage Impact
Received PWC services	10.6 ^{**}
Impact per Each Surrounding PWC Home	1.9 ^{**}
Adjusted R ²	0.80

^{**}Statistically significant at the 1 percent level.

On average, estimates indicated that if two homes in the same neighborhood were sold during the same period, and one of those homes was a PWC client prior to sale, the PWC home's sale price would be about 10.6 percent greater than the non-PWC home. In 2009, the average PWC home sold for about \$70,000. Thus, about \$7,000 of a home's value was preserved by PWC's efforts.

Additionally, estimates indicated each surrounding home serviced by PWC in the neighborhood was associated with a 1.9 percent higher sale price. In 2009, the overall average sale price was about \$134,230. Thus, every PWC home in the neighborhood contributed, on average, about \$2,600 in value to other properties.

To check how robust the above results were, our team applied the same model to a narrower sample of homes, including only neighborhoods where PWC homes were located. In other words, the narrower sample included PWC clients and homes within PWC's reach. Eliminating Cincinnati neighborhoods without PWC clients reduced the sample size to 1,904 total sales, all occurring prior to 2010.

Once neighborhoods without PWC homes had been excluded, remaining houses were smaller and generally had lower sales prices (matching PWC's mission to serve low-income populations). Thus, remaining non-PWC properties more closely approximated observable characteristics of PWC properties.

The narrower sample analysis indicated, after considering other relevant factors (including home conditions), PWC's home repair and weatherization services still played an important role. On average, estimates indicated the following: if two homes in the same neighborhood sold during the same period, and one was a PWC client, the PWC home's sale price would be about 6.4 percent greater than a non-PWC home's. In 2009, the average PWC

home sold for about \$70,000. Thus, about \$4,490 of a home's value was preserved by PWC's efforts.

Additionally, estimates indicated each surrounding home PWC serviced in the neighborhood had a 3.8 percent higher sale price. As the overall average sale price was about \$103,989 in 2009, every PWC home in the neighborhood contributed an average of \$4,000 in value.

Student Mobility

Data and Methodology

Our evaluation sought to test a hypothesis that PWC's work in homes helps children residing in those homes experience less mobility and improves their school performance. Previous research documented that mobility, particularly forced residential mobility, negatively impacts children in school (Buerkle and Christenson, 1999; Crowley, 2003; Goetz, 2002; Lyle, 2006; Rumberger, 2003; Simpson and Fowler, 1994; Swanson and Schnerder, 1999). Additional research shows low-income weatherization projects can help reduce participant families' forced mobility by making energy expenses more affordable and reducing shut-offs (Bruchs, et.al, 2007; Dalhoff, 2007; Khawaja, 2001).

For this analysis, our team utilized data reported by the Ohio Department of Education. These data, drawn from Ohio Department of Education school districts, were available at district and building levels. Our analysis used building-level data specific to Hamilton County school districts to characterize local experiences with student mobility. Specifically, the analysis sought to describe the academic and mobility characteristics of students in school buildings located within the area where PWC has concentrated its efforts.

To examine mobility's impact on student academic performance, building-level data were analyzed for the last five and 10 academic years. These data included: the proportion of students scoring proficient (or better) in selected subjects, as distributed across various grades, individual school buildings, and mobility status. As school districts containing only one school (generally a public charter school) were eliminated from the sample, results included only school buildings in one of Hamilton County's 22 public school districts. The State reported student mobility status using three categories: those in the same building for less than a full academic year; those present for more than one but less than three full academic years; and those present more than three years. Though students' standardized test scores provided a component of the State's rating system for schools and districts, only students present in the same building for at least one academic year counted towards that rating. Additionally, students present less than a full year often missed testing dates. Consequently, proficiency percentages were reported for this most highly mobile group of students. The proportion of students present no more than two years, and scoring proficient or better, have been compared to students present for three or more years.

To analyze these test scores, we compared average proficiency rates for reading and math across grades for the two mobility groups of students, in each school building, using a standard analysis of variance (ANOVA)—a technique selected due to the limited amount of information available. For this analysis, 10-year data for non-urban core school districts were used.

As noted, while mobility proved disruptive to students moving, continual turnover in classrooms could also be disruptive to students who remain. Using the five-year, available

building-level data on student body compositions, teacher characteristics, budget allocations, measures of school quality, and proficiency rates, the association between student turnover within buildings and the progress of the remaining students was examined.

Results

Analysis results, shown in the tables below, indicated that, over the past decade and on average, fewer of the more highly mobile students scored “proficient” on end-of-the-year standardized reading and math tests. The results also indicated math performance tended to suffer more than reading, with larger proficiency gaps per mobility group. In other words, a lower proportion of more mobile students (averaging from about 15 to 17 percentage points less) demonstrated basic proficiency on these exams.¹

Table 4. Proportion of Students Scoring “Proficient” on Standardized Tests by Mobility Group

Test	1 to 2 Years	3 Years or More	Difference	P-value
Reading	66.2%	80.9%	14.7%	<0.0001
Math	56.6%	73.2%	16.6%	<0.0001

While mobility appeared to negatively impact students’ academic progress, a question remained as to whether mobile students’ classmates would be affected. Five-year building level data were used to build a model to explain the proportion of students with an overall score below “proficient” on the State’s standardized exam as a function of various characteristics (including the proportion of highly mobile students in the school, defined as those present for less than a full year). Table 5 shows the model’s key coefficient and model fit statistics.

Table 5. Impact of Student Turnover on Below-Proficiency Rates

Proportion of Students Present Less than One Full Year	0.59**
Adjusted R ²	0.78
Number of Observations	943

** Statistically significant at the 1 percent level.

After controlling for other characteristics, including student composition, teacher characteristics, school years, and school districts as well as percentages of indicators met in the previous year (the school quality measure), the model indicated a 1 percentage point increase in the proportion of highly transient students increased proportions of other students scoring below proficiency by 0.59 percentage points. With an average school building having about 500 students, this suggests five additional students present less than a full academic year would be associated with approximately three more students scoring below “proficient” on the State’s standardized test.

PWC’s efforts may help promote more positive home environments for students by addressing sources of stress and discord. While residential programs do not serve as panaceas for underperforming schools, promoting safe and stable residential environments contributes to

¹ Analysis that separated primary and secondary school buildings yielded a similar pattern of results.

improved student performance. As the current research establishes reducing student mobility can improve academic performance, the next step will be analyzing the extent that PWC's efforts reduce forced mobility. For this analysis, our team currently is examining billing data for PWC participants to understand whether residential turnover rates vary for households receiving PWC services.

Process Evaluation Findings

Though PWC program participants have varied demographic profiles, most participants (66 percent) are older and/or disabled. Of these households, 37 percent of households served in 2009 had a member with a disability. PWC also served a small group of grandparents (3 percent of households) raising grandchildren in their homes.

Participants' homes tended to be older—almost three-quarters of survey participants' homes were over 50 years old. Our in-home interviews with the 15 participants found most lived in homes around 100 years old, with one home aged at 200 years.

Cadmus drafted a brief survey tool, asking targeted and simple questions to gauge program effects. In particular, we remained sensitive to the population's age, that most households had very low incomes, and most likely experienced instability on a regular basis. The survey focused on exploring participants' program experiences, their satisfaction, and specific questions regarding benefits they experienced since receiving services.

When we asked participants to rate the quality of program services received, we used a four-point scale, utilizing the familiar categories of "excellent," "good," "fair," and "poor." Each rating question was followed by an open-ended question, probing for details on respondents' experiences. We also asked respondents about benefits we expected they might experience through participation, such as: increased comfort, reduced stress, improved health, reduction in forced mobility, and improved safety. Respondents were asked to rate benefits on a five-point scale (e.g., reduced stress significantly, reduced stress somewhat, stress remained the same, increased stress somewhat, or increased stress significantly).

Energy Conservation

PWC's energy conservation services provide whole-house weatherization for participating households. While its Ohio program does not provide weatherization with WAP dollars, PWC does implement its energy conservation program in a manner consistent with other WAP delivery agencies. Each participating home receives a full weatherization audit, which includes: a review of insulation levels in walls, attic, and floors; testing refrigerator usage; determining infiltration locations in the home; checking ductwork for leaks; cleaning and tuning furnaces and central air systems; installing energy-efficient lighting; and installing hot water saving measures. PWC staff also check for homes' energy-related health and safety issues, and can provide repair and replacement of heating systems and water heaters, ensuring adequate ventilation, and installing carbon monoxide and fire detectors.

The auditor inputs the home's energy use history and recommended energy-efficiency improvements into an audit software tool, which calculates the suggested measures' cost-effectiveness. PWC's utility funding requires that measures installed in the home will generally need a collective savings-to-investment ratio (SIR) of 1.5 or greater (most weatherization agencies are able to install measures that achieve an SIR of 1.0). Limited funds are available to

cover installation of energy-saving or health and safety measures not meeting this requirement. To provide the most comprehensive services for each home, PWC leverages dollars from multiple sources; however, funds limitations restricts a small number of participating homes from receiving full weatherization services.

PWC mostly employs in-house crews to complete energy conservation services deemed cost-effective, along with health and safety repairs or upgrades. Auditors also provide participants with energy education and specific recommendations for steps to further reduce their energy consumption.

Participant Feedback. All interviewees (n=15) and survey respondents (n=200) receiving energy conservation services were asked questions about their satisfaction with PWC services and the benefits they experienced from program participation. Topics included impacts on client housing—such as their intent to take action and alternate plans in program’s absence of the program—as well as the program’s impacts on health and well-being.

When survey respondents were asked to rate the quality of PWC’s energy conservation work, 55 percent rated it as excellent, while another 36 percent rated it as good. Several of those who rated PWC services as fair or poor cited the lack of other services (such as home repairs) as their primary source of dissatisfaction (PWC does not have sufficient funding to provide all homes with a complete array of services). Of participants interviewed in their homes, 14 rated PWC services as excellent, while one rated them as good.

Over half of the survey respondents (57 percent) indicated their energy use decreased following program participation. Respondents not enrolled in Ohio’s bill reduction program were asked if they noticed an increase or decrease in their energy bills since PWC completed work on their homes: 47 percent noted a decrease, while 36 percent said their bills stayed the same. Fourteen percent said their bills increased.

An important PWC goal is keeping residents living safely and independently in their homes. Unaffordable energy bills, shut-offs, and unsafe living conditions can lead to forced relocations for low-income families. Cadmus asked survey respondents if PWC services helped them stay in their homes; the majority (87 percent) said yes. We asked participants where they would go, had they been unable to stay in their homes. Figure 1 shows their responses.

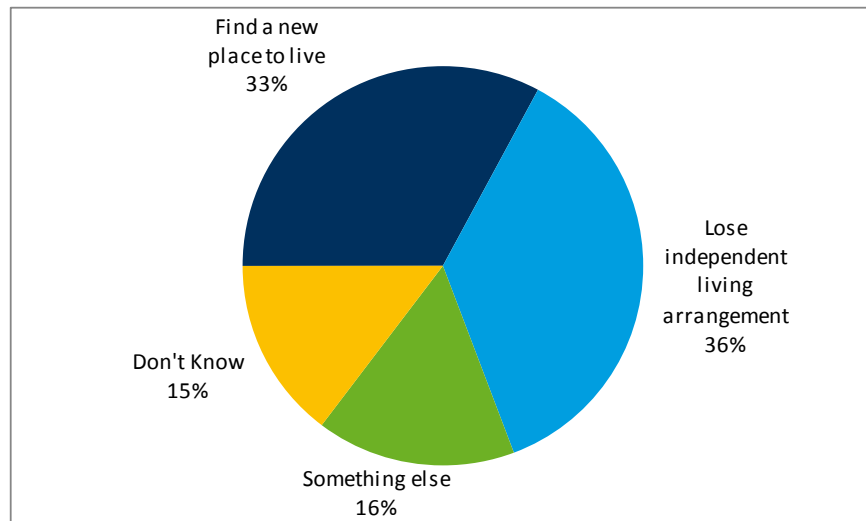


Figure 1. Alternatives to Current Living Arrangement

These findings indicate a reduction in forced mobility can generate savings for society as well as for low-income families. For example, home weatherization services help people avoid moving into nursing homes, public housing, and homeless shelters.

Health and Well-being. Respondents were asked to indicate changes in stress or worry levels after PWC provided services in their homes, using the five-point scale described above, where 1 is “increased your stress significantly” and 5 is “reduced your stress significantly.” The weighted average for all responses was 4.3, indicating PWC’s energy conservation services successfully reduced client stress and worry. Forty-one percent of respondents receiving energy conservation services also reported feeling safer in their homes since PWC completed its work.

Cadmus asked respondents with insulation or air sealing completed in their homes if they noticed fewer drafts and air leaks in their homes. The majority indicated a reduction in drafts, with 44 percent saying their homes were much less drafty, and 39 percent reporting their homes were somewhat less drafty. One respondent remarked her home’s reduced drafts dramatically improved her arthritis symptoms.

Frequently, energy conservation services can increase participants’ sense of comfort in their homes. We asked respondents to rate changes in comfort on a five-point scale. Fifty-three percent of respondents indicated feeling a lot more comfortable, while an additional 30 percent indicated they were somewhat more comfortable. The respondents offered additional comments on the energy conservation work completed in their homes, including: “the home is a lot warmer in all the rooms they worked on and my bill is lower,” “they really took the time to find out exactly what made my house drafty and gave me tips,” and “my house is a lot warmer.”

Cadmus specifically asked respondents about health changes they experienced from participating in the program: 44 percent reported improved health. Fifteen percent also indicated that, after PWC services on their home, they sought medical attention less frequently.

Home Repairs

PWC's program includes major and minor repairs to participants' homes. Major repairs include: replacing roofs, electrical system upgrades, fixing collapsing ceilings and floors, and repairing or replacing plumbing and toilets. Minor repairs include: unclogging drains, fixing leaks, replacing light fixtures, and repairing broken doors and windows. For major repairs, PWC utilizes a professional and licensed staff of contractors, roofers, plumbers, and electricians. For minor, non-emergency repairs, PWC turns to trained volunteers (or teams of volunteers), supporting them with access to the professional staff, should issues arise.

When asked respondents to rate the quality of repairs performed, 67 percent reported them excellent and 28.7 percent reported them good. Cadmus interviewers, identifying and reviewing completed repairs in homes, received feedback from participants identifying the following benefits:

- Helped maintain the home's overall structural integrity.
- Increased home safety and preservation of the home's habitability.
- Reduced expenses for low-income families.

Staff interviewed one woman, in her late seventies, at her home, which was over 100 years old. PWC recently replaced the home's badly degraded roof, removed a molded, collapsed ceiling, and cleaned mold from the attic. This very cost-conscious resident sometimes cut back on necessities to pay her bills, and likely would not have been able to afford these repairs without assistance. Prior to the repairs, her family had suggested she move. Clearly, she gained a great deal of satisfaction from remaining in her home and neighborhood.

Modifications for Mobility

PWC installs wheelchair ramps, stairway railings, walk-in showers, and support bars near toilets, showers, and tubs to improve residents' mobility both in and out of their homes. Both participants interviewed in person and those surveyed by phone indicated mobility modifications immediately and profoundly affected their lives. In-home interviews identified the following benefits:

- Ability to leave home easily and safely; increased participant independence; sense of security; improved physical and mental health; and increased engagement in their communities.
- Ability to move around homes, including taking care of personal bathing and toileting, without fear of injury to themselves or their caretakers.
- Alleviation of situations where past accidents occurred, such as falling down stairs.

Survey respondents receiving mobility improvements inside their homes confirmed their ability to move about their homes greatly improved, rating the changes a 4.7 on a 5-point scale. Similarly, respondents with mobility modifications on the outside of their homes, asked whether they could enter and exit their homes more easily, rated the outdoor modifications a 4.9 on a 5-point scale.

Cadmus' interviewers noticed the overall effects of mobility improvements in several respondents' homes. One woman, in her late sixties, had been crawling up and down the stairs of her home. At the top of the stairs, her husband, in his seventies, would help lift her into a standing position. A stair lift installed in their home, which improved her mobility and both residents' safety, increased their overall sense of security.

Conclusion

While PWC's efforts produce traditional energy benefits, their work also generates nonenergy impacts, benefitting the wider community as well as participants. In particular, their work providing energy conservation services creates improvements in participants' overall health and comfort. They also help reduce demand on services such as health care and subsidized housing, benefitting society overall. PWC services allowing low-income residents to remain in their homes may reduce residential forced mobility among this population. As more mobile students also tend to achieve less academically, reducing forced mobility may lead to improved educational performance. In this way, PWC's work should be considered as part of a comprehensive approach to reducing poverty.

Additionally, PWC's work has helped stabilize home sale prices in the area, even amidst a weak economy characterized by collapsing home values. The positive impacts on home sale prices for PWC clients not only helps those clients directly, facilitating their voluntary departure from their homes, but benefits neighbors by maintaining overall property values. The wider community also benefits from stabilizing property tax revenues.

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