

Weatherization Plus Health: Injury Prevention Pilot

Evaluation Results
June 2016



Prepared for:



NEW OPPORTUNITIES, INC.

Building Relationships to End Poverty

Prepared by:



National Center for
HEALTHY HOUSING

Summary

Significant reductions in falls and falls requiring assistance may be obtained by incorporating injury prevention home assessments and home modification into weatherization/energy program services. In this study of 49 weatherization clients receiving a package of injury prevention services, the percentage of clients reporting a fall in the prior six months declined from 94% to 9% following injury prevention work. The percentage of clients with a fall requiring assistance also declined (23% to 3%). The declines in falls requiring assistance were greater in the study group than in a comparable group of older adults using a home emergency VoiceCare system (20% decline in study group vs. 10% in comparison group), but the difference was only marginally significant ($p=0.07$). Because the comparison group did not track falls that did not result in a call for assistance, the study was not able to examine how the decline in falls would compare to a non-treatment group.

At a median cost of \$2,058, this prevention work offers the potential to avoid expensive fall related medical costs often paid by state Medicaid (lift assistance, transport to hospital, hospital admission, rehabilitation services, long term care for those not able to continue to live independently). The integration of injury prevention into weatherization work, which targets lower income seniors with high energy use, offers great potential to prevent poor health outcomes and reduce medical expenses. The weatherization and energy workforce is capable of delivering integrated injury prevention services with appropriate occupational therapy practitioner partners who specialize in environmental modifications.

Overview

New Opportunities, Inc. (NOI) received a grant from the Connecticut Department of Social Services (DSS) to evaluate the health benefits and associated costs of adding an injury prevention housing modification to weatherization jobs. The goal of this innovative coordinated approach was to determine if adding an injury prevention package to weatherization could yield significant reductions in falls and transport to a hospital among the low income elders and to track the cost of integrating injury prevention into energy work. Reductions in housing-based falls among elders in Connecticut will help to reduce or delay the need for state funded medical care and long-term care facilities for lower income seniors.

Study Partners

Program Implementation Partners

NOI served as the overall project manager, coordinated the injury prevention assessments and home repairs, conducted the weatherization work, and obtained the data on falls and transport pre- and post-intervention. NOI is a community action agency that serves Waterbury, Meriden, Torrington and 27 surrounding [Connecticut towns](#). NOI offers a variety of social

service [programs](#) designed to eliminate poverty and assist people in need, including weatherization and Emergency Response System – VoiceCare system. VoiceCare® is an emergency response system installed in a person’s home that directly links them to an On-Call Response Center 24 hours a day. The system consists of a two-way console and a wearable long-range activator.

Tracy Van Oss, an occupational therapist with a specialization in environmental modification, was consulted to conduct home assessments and recommend individualized home modifications. Dr. Van Oss is also an Associate Clinical Professor of Occupational Therapy at Quinnipiac University.

Evaluation Team

National Center for Healthy Housing and Tohn Environmental Strategies worked with the project to design the intervention, analyze the pre- and post-intervention data and prepare this evaluation report. NCHH and TES are nationally recognized experts in designing and evaluating healthy homes work.

Funders

DSS provided Community Services Block Grant (CSBG) discretionary funding for injury prevention measures, home assessments, and evaluation. The Connecticut Department of Energy and Environmental Protection (DEEP) provided USDOE Weatherization Assistance Program funds for energy conservation measures conducted as part of the weatherization work. These federal weatherization funds were supplemented by the Connecticut rate payer funded Home Energy Solutions Income Eligible program, administered by the Eversource Energy. These funds were also used to support energy conservation measures in homes of income eligible clients participating in this study. Funders for the Elder Services Emergency Response System include: DSS Medicaid waiver program, Connecticut Home Care Program, ABI & PCA waiver program, Western Connecticut Area Agency on Aging – Caregiver & Respite Programs (Federally funded), and private subscribers.

Program and Study Design

Enrollment Criteria

The program targeted low income clients with a high risk of falls. To qualify for the study, clients had to meet the below three criteria:

- 1 Low income and eligible for CSBG funding. Income eligibility is based on income up to 125% of the federal poverty income guidelines. For this pilot program the 2014-2015 federal income guidelines were followed. For example, a family of 1 could make up to \$14,587.50, a family of 2 could make up to \$19,662.50, and a family of 3 could make up to \$24,737.50.
- 2 70 years or older (older clients are at a greater risk for falls) and had a slip or fall in prior 6 months.
- 3 Eligible for weatherization services to reduce the energy use among low income clients with high energy use. Weatherization programs also prioritize seniors over 60 years of age.

Injury Prevention Services and Repairs

An injury prevention intervention was added to the standard weatherization services package. The injury prevention activity began with a home visit conducted by an occupational therapist, who conducted an assessment of home injury risk factors. The injury risk assessment identified personalized priority housing modifications to reduce the risk of falls inside and leading into the home. The selection of potential individualized home modifications was determined based on the resident's physical ability, disease progression, and daily routine. Such modifications included: hand railings, repairs to steps, ramps, grab bars, raised water conserving toilets, improved lighting, and modifications to reduce other trip hazards. An energy auditor accompanied the occupational therapist on the home visit, and in some instances the injury prevention risks assessment was conducted during the same visit as the energy audit.

The weatherization program hired contractors from its existing subcontracting network as well as additional new vendors to install the recommended home modifications. The energy auditor supervised the injury prevention work and also oversaw the installation of the weatherization work. Typical weatherization work includes: air sealing, sidewall and attic insulation, repair or upgrades to heating systems, and health and safety measures including smoke and CO detectors and the addition of ventilation to improve indoor air quality.

Comparison Group

The evaluators identified NOI clients who were enrolled in the VoiceCare emergency System response program to serve as a study comparison. By enrolling in this program a client self-identified as being at risk of falls. The evaluation sought to determine if the changes in calls for assistance and need for transport to medical facilities in the study group was different than the changes in the comparison group during this same period.

Injury Prevention Data Tracking

The project tracked several fall and fall related transport events pre- and post-intervention:

1. Falls in prior 6 months (study group only)
2. Fall in prior 6 months that results in call for assistance
3. Fall in prior 6 months that result in transport to hospital
4. Fall in prior 6 months that resulted in hospital admission.

For the clients in the VoiceCare system, data were drawn from the VoiceCare records. For clients in the intervention group, data were obtained through a questionnaire administered via the phone by NOI staff. Baseline data were collected before the work as part of the eligibility criteria. Follow up data were collected at least 6 months after injury prevention work was completed.

Work Completed and Results

Between March and September 2015, NOI conducted 51 interviews with older adults about their history of falls in the prior six months. Following the interviews, injury prevention services were provided to 49 of these clients. All the homes will also receive energy conservation services; some

have received these services, while other homes will receive these services later in 2016. In June 2016, NOI attempted to re-interview the participants about their falls in the prior six months and successfully completed 35 follow-up interviews.¹

Work Completed

The injury prevention work was completed in the fall of 2015. The full list of work performed is shown below in Table 1. The most common repair was the installation of grab bars in the bathroom (31 homes), followed closely by other bathroom modifications to increase the height of the toilet (25), and installation of a dual hand held shower (21). The median number of physical treatments per home was 6.5. In addition to these physical treatments, 91% of the participants received non-slip footwear.

Table 1: Common Injury Prevention Home Modifications *

	Number of Homes w/Installation	Percentage of Homes w/Installation
Grab Bar: Bath and/or Toilet	31	66%
High Line Toilet	25	53%
Dual Shower Head/Hand Held	21	45%
Wood Railings	20	43%
Outside Metal Railings	19	40%
Tub/Shower Seat	18	38%
Storage Bin (small or large)	17	36%
Light Fixture (install/repair)	17	36%
Chair w/bilateral Arms	16	34%
Non-skid Bath Mats	13	28%
Rugs - Secured	12	26%
Repair Steps	11	23%
Repair Walkway	10	21%
Lift Chair	8	17%
Rocker Light Switch	5	11%
Clapper	5	11%
Night Light	5	11%

*45 other activities completed in 1-4 homes

¹ Of the 14 participants not re-interviewed, 7 did not answer/did not have an operating phone/were unavailable; 3 were deceased; 2 refused; and 2 spoke Spanish and there was not a Spanish speaking interviewer available. Of potential interest: Of the 9 participants at baseline who reported more than one fall that needed assistance, 67% did not reply at follow-up (3 deceased, 2 not available, and 1 refusal) – Of the remaining 40 baseline participants, 20% did not reply (5 not available, 2 Spanish speakers, and 1 refusal).

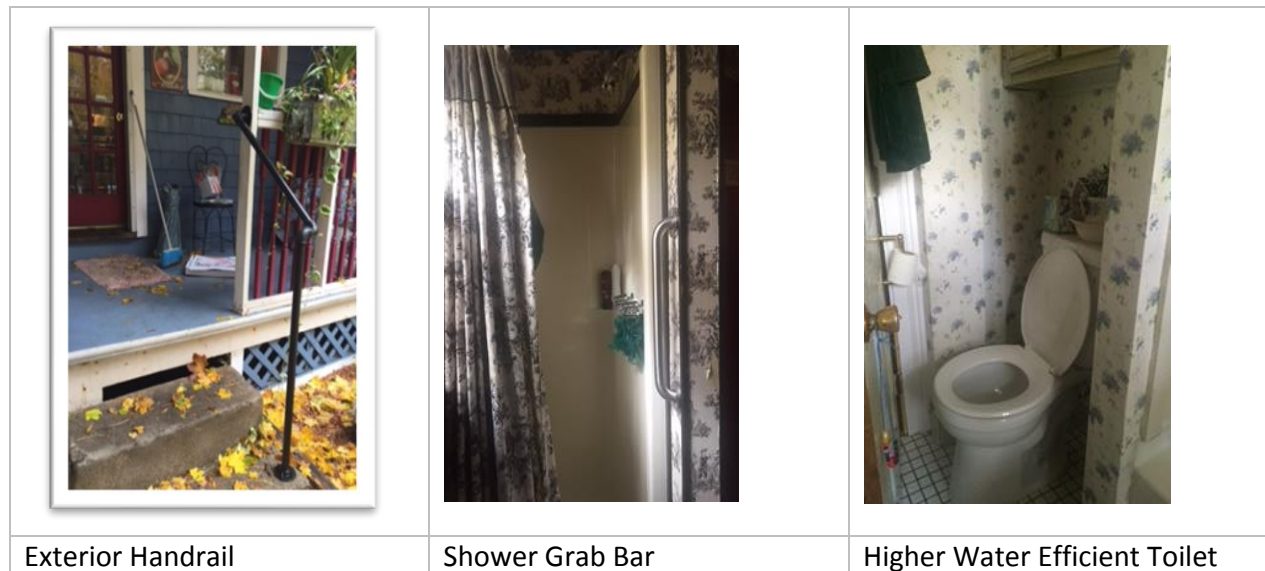
The median cost of the injury prevention assessment and home modifications was \$2,058, with costs ranging from \$457 to \$6,786 (Table 2). Visual images of sample project work are provided below.

Table 2: Injury Prevention (Physical Improvements) Costs

	Matched Units (34)	Unmatched Units (13)	All Units (47)*
Mean Cost	\$2,313	\$2,494	\$2,363
Median Cost	\$2,028	\$2,263	\$2,058
Minimum Cost	\$ 457	\$ 831	\$ 457
Maximum Cost	\$6,474	\$6,786	\$6,786

*One unmatched unit not completed because resident passed away; cost missing for one unit

Figure 1: Injury Prevention Measures



Changes in Falls and Calls for Assistance in Intervention Group

Table 3 and Figure 2 provides a summary of the fall outcomes by group. At baseline prior to the injury prevention work, 96% of study participants indicated that they had fallen in the prior 6 months. Because enrollees were required to have had a slip or fall to be eligible, this high rate of falls was expected. Prior studies have found that about 30% of older adults fall annually.² Matched data, where the team had access to both baseline and post follow up data, was available for 35 study participants. In the matched set, 94% of baseline participants indicated they had fallen in the

² Gillespie LD, Robertson MC, Gillespie WJ, Sherrington C, Gates S, Clemson LM, Lamb SE. Interventions for preventing falls in older people living in the community. *Cochrane Database Syst Rev.* 2012 Sep 12;(9)

prior 6 months, 24% fell and called for assistance, 13% fell and reported being transported to the hospital, 6% fell and required hospital admission.

The intervention was associated with significant reductions in both falls (94% to 9%) and falls with calls for assistance (23% to 3%). Despite the small number of study participants, which can make showing a statistically significant change difficult, the evaluation documented statistically significant reductions in these two categories. Of those who did fall (33 at baseline and 3 at follow up), the percentage that called for assistance remained similar (24% vs 33%), indicating that roughly one in three falls required assistance. The big improvement observed was the decline in falls.

Table 3: Fall Outcomes

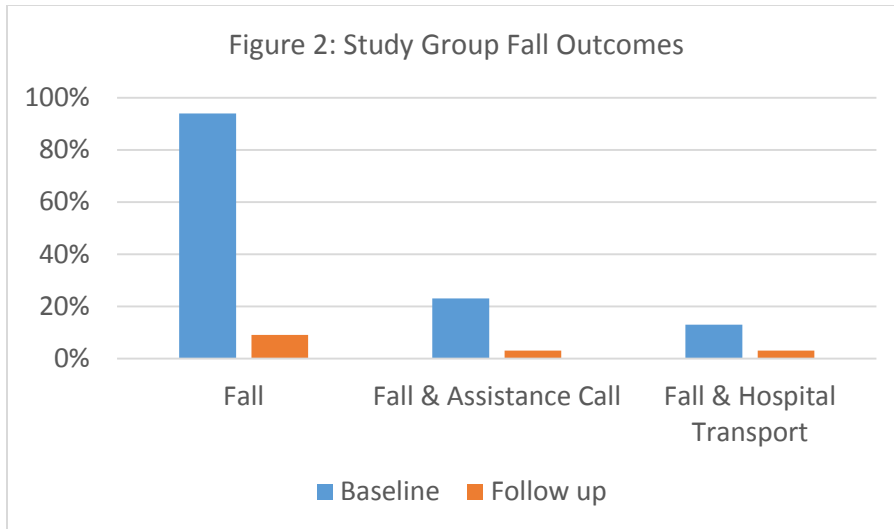
Response	Baseline – All (49) N		Baseline – Matched (35) N		Follow-Up – Matched (35) N		Baseline to Follow-Up (p-value) ³
Fell (prior 6 months)	49	47 (96%)	35	33 (94%)	35	3 (9%)	<0.001**
Fell and Called for Assistance	49	15 (31%)	35	8 (23%)	35	1 (3%)	0.020**
Fell and Transported to Hospital	41 ^a	7 (17%)	31 ^a	4 (13%)	35	1 (3%)	0.180
Fell and Hospital Admission	46 ^a	4 (9%)	33 ^a	2 (6%)	34 ^a	0 (0%)	0.157
If Fell, Called for Assistance	47	15 (32%)	33	8 (24%)	3	1 (33%)	1.000
If Fell/Called, Transport	7 ^b	7 (100%)	4 ^b	4 (100%)	1	1 (100%)	-
If Fell/Called, Admission	4 ^b	4 (100%)	2 ^b	2 (100%)	1	0 (0%)	-

^a Question not completed by all respondents with falls

^b Question not completed by all respondents with falls/calls.

**Statistically significant @ p<0.05 *Statistically significant p≥0.05 and p<0.10

³ McNemar’s test was used to test that the percentages were the same at baseline and follow up for the matched set of data.



The majority of the 8 clients who called for assistance at baseline made only one call for assistance (Table 4).

Table 4: Frequency of Assistance Calls for Falls at Baseline

Number of Calls	1	4	8	Not Reported
Frequency	5	1	1	1

The most common reasons for the calling for assistance was to request help with getting up (lift assistance) and to report a fall resulting in an injury, followed by a general fall (Table 5).

Table 5: Reported Reason for Assistance Call

Reason for Call	Fall	Fall/Injury	Lift Assistance
Frequency	3	8	8

Changes in Falls and Calls for Assistance in the Comparison VoiceCare Group

We compared VoiceCare results from a six-month period in 2015 to a six-month period in 2016 to match the time frame used in the intervention group. The objective was to see if there were community-wide changes that might explain changes in rates of falls with calls for assistance. VoiceCare data can be used to monitor changes in calls for assistance and transports to hospitals, but it does not offer information about falls without assistance nor hospital admissions. Thus we cannot compare the significant declines reported in falls (prior 6 months) of the study group, which dropped from 94% to 9%, with the VoiceCare comparison group.

The results provided in Table 6 show a modest decline in the percentage of participants who fell and required assistance (38% to 28%) or fell and required transport (20% to 10%). The 36

participants who fell during the 2015 observation period fell 62 times, an average of 1.7 falls per participant who fell. In 2016, the 66 participants who fell, fell 124 times (1.9 falls/participant).

When considering all falls, transport to a hospital fell from 35% to 25%. The percentage of falls that were reported as “falls” (compared to “fall/injury” or “lift assist”) requiring transport was 27% at baseline and 22% in the follow up interval (Table 7).

Table 6: VoiceCare Results

	March 2015-August 2015		December 2015-May 2016	
Participants who utilized system	94		238	
Participants Requiring Fall Assistance	36	38%	66	28%
Participants Requiring Fall Transport	19	20%	23	10%
Total Falls	62		124	
Fall	44	71%	109	88%
Fall/Injury	15	24%	14	11%
Lift Assist	3	5%	1	1%
Outcome				
Transport to Hospital	22	35%	31	25%
No Transport Required	40	65%	93	75%
Participants w/Fall Requiring Assistance	36		66	
One Fall in Period	25	69%	47	71%
2-5 Falls in Period	9	25%	16	24%
6 or more Falls in Period	2	6%	3	5%

Table 7: VoiceCare Outcomes by Call Report

Reason	March 2015-August 2015			December 2015-May 2016		
	Transport	No Transport	% Transport	Transport	No Transport	% Transport
Fall	12	32	27%	24	85	22%
Fall/Injury	10	5	67%	7	7	50%
Lift Assist	0	3	0%	0	1	0%
All Falls	22	40	35%	31	93	25%

Table 8 shows the changes in the number of participants with a fall and call for assistance, as well as fall and transport. The study group had fewer participants with falls and calls when compared with the VoiceCare participants at baseline and at follow up. There was a 10% greater reduction in the falls and calls for study group participants versus VoiceCare participants from baseline to follow up (-25% vs -15%). However, the sample size for the study group is sufficiently small to make it challenging to show a statistically significant difference between the reductions in study group

falls/calls when compared to the VoiceCare group. The odds of “Participant with fall & call” at baseline relative to follow-up for VoiceCare was marginally significantly different from the odds of “Participant with fall & call” at baseline relative to follow-up for the study group (Odd Ratio=10.1 and 1.62; p=0.073).⁴ There was no difference between the VoiceCare and study group for falls with transport (7% vs 7%).

Table 8: Comparison of Injury Questionnaire Findings to VoiceCare Findings

	Baseline – Matched (2015)			Follow-Up – Matched (2016)		
	VoiceCare	Study Group	Diff.	VoiceCare	Study Group	Diff.
Participants w/ Fall & Call	38%	23%	-15%	28%	3%	-25%
Participants w/Fall & Transport	20%	13%	-7%	10%	3%	-7%
One Fall in Period	69%	63%		71%	100%	
2-5 Falls in Period	25%	25%		24%	0%	
6 or more Falls	6%	13%		5%	0%	

Limitations

The study is relatively small and hence it is difficult to observe statistically significant improvements in falls resulting calls (8 at baseline, 1 at follow up), falls needing transport (4 at baseline, 1 at follow up), of falls with hospital admission (2 at baseline, 0 at follow up). However, improvements were observed in all categories.

Although the study was able to compare outcomes for participants who had falls that resulted in calls for assistance with a similar population not getting injury prevention services, the study did not have a comparison group of people who fell without a call for assistance. Therefore, we are not able to assess how much of the decline in falls can be attributed to the intervention and how much may be due to people being less likely to fall two years in a row (regression to the mean).

It is possible that the clients who responded to the post-intervention survey were more satisfied than those who did not respond or that their positive reactions to the new home modifications could have led them to provide a more positive assessment of falls in the past 6 months. This could have led to a more positive set of responses in the post-intervention responses.

⁴ The statistical test used was the Breslow-Day test for homogeneity of odds ratios.

Conclusions

A combined injury prevention and weatherization service delivery is both feasible and effective. This study observed significant declines in falls (drop from 94% of study participant reporting a fall to 9%; falls with calls for assistance dropped from 23% to 3%). The median cost of the home modification repair work (\$2,058) is reasonable if just one out of 17 interventions results in an avoided hospital stay (estimated at \$35,000 for a hospital admission due to a fall).⁵ There would also be expected benefits for avoided transport via an ambulance (estimated at \$680), rehabilitation stays, and longer term care facilities that are required for seniors who fall and are no longer able to live independently.⁶ The Connecticut Medicaid program pays for many of these health care costs that could be potentially avoid through the study injury prevention measures. The weatherization and energy workforce is capable of delivering integrated injury prevention services with appropriate occupational therapy practitioner partners who specialize in environmental modifications.

⁵ Centers for Disease Control, Costs of Falls Among Older Adults, <http://www.cdc.gov/homeandrecreationalafety/falls/fallcost.html>, accessed 6/23/16

⁶ <http://fairhealthconsumer.org/medicalcostlookup.php> accessed 6/23/16