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Does a multicomponent home intervention reduce functional difficulties in community-dwelling older adults as compared to no intervention?

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Evidence Exchange

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CRITICALLY APPRAISED PAPER (CAP)

Gitlin, L. N., Winter, L., Dennis, M. P., Corcoran, M., Schinfeld, S., & Hauck, W. W. (2006). A randomized trial of a multicomponent home intervention to reduce functional difficulties in older adults. *Journal of the American Geriatrics Society, 54*(5), 809–816. http://dx.doi.org/10.1111/j.1532-5415.2006.00703.x

CLINICAL BOTTOM LINE:

Many older adults live with chronic conditions that may affect their ability to safely perform their daily occupations. Small decreases in ability of older adults to function independently can have profound effects, possibly leading to hospitalization, institutionalization, or death. However, preventative home-based interventions for older adults typically are not reimbursed by Medicare or other insurance carriers. This study on intervention effectiveness contributes to a growing body of evidence for providing preventative home-based intervention to older adults to support their abilities to function independently in their communities.

This study examined whether a preventative home-based intervention, including occupational therapy and physical therapy, was effective in reducing functional difficulties in older adults with chronic conditions. The researchers found statistically significant reductions in difficulty in activities of daily living (ADLs) and instrumental activities of daily living (IADLs), with the greatest improvements in bathing and toileting, and a decrease in home fall hazards, in comparison to a no-intervention control group. The effect sizes for all treatment outcomes were small to medium (ranging from 0.19 to 0.26). The intervention participants also showed less difficulty in functional mobility and transfers and increases in self-efficacy and use of functional strategies, but these differences were not statistically significant.

The intervention involved multiple occupational therapy contacts (4 90-minute visits and 1 20-minute telephone contact, plus 3 follow-up telephone calls) and one physical therapy visit (90 minutes). A client-centered occupational therapy process was followed to identify problem areas, analyze client performance, and introduce and reinforce strategies and modifications for improvement in occupational performance. The physical therapist worked on balance, muscle strengthening, and fall recovery techniques. Home modifications to increase home safety were provided as needed, including installation of grab bars, rails, and raised toilet seats. Telephone follow-up was provided to reinforce intervention strategies during the 6 months following the initial intervention period.

This study showed that significant improvements in functioning may be possible with this preventative intervention. However, limitations of the study are substantial. The sole use of self-rating systems for measuring the changes in function does not provide the strength of support that would be provided by verification through more objective assessment tools. Nevertheless,

the positive results of this study provide evidence of the efficacy of preventative intervention with community-dwelling older adults. This evidence could be particularly useful for occupational therapists who work with older adults as they advocate for insurance coverage for preventative home-based intervention, apply for grants to fund such interventions, or seek evidence to support enhancement of existing home-based interventions with a stronger preventative focus.

RESEARCH OBJECTIVE(S)

List study objectives.

To measure the effectiveness of a home-based preventative intervention, including occupational and physical therapy, in reducing functional difficulties, fear of falling, and home fall hazards, while also increasing confidence and coping strategies in older adults with chronic conditions.

DESIGN TYPE AND LEVEL OF EVIDENCE:

Level I: Two-group randomized controlled trial

SAMPLE SELECTION

How were subjects recruited and selected to participate? Please describe.

The participants were recruited for the study through an area agency on aging, media announcements, and posters at senior housing and community settings between 2000 and 2003. Eligibility was determined with a brief telephone screen to interested persons.

Inclusion Criteria

The older adults included in the study were community-dwelling adults aged 70 or older; cognitively intact (Mini-Mental State Examination score >23); English speaking; not receiving home care; and reported the need for help or difficulties with two IADLs or one or more ADL.

Exclusion Criteria

The community-dwelling adults excluded from the study were totally dependent, homebound, or were receiving services to address functional problems.

SAMPLE CHARACTERISTICS

N = (Number of participants taking part in the study)	**319**		
#/ (%) Male	Total: 58/(18.2%)	#/ (%) Female	Total: 261/(81.8%)
Ethnicity	**White:** 168/(52.7%) **African American:** 145/(45.5%) **Other**: 6/(1.8%)		

Disease/disability diagnosis	Participants were community-dwelling older adults and reported a mean of 7 health conditions: 84% arthritis, 71% hypertension, 43% cataracts or macular degeneration, 39% cardiovascular problems, and 23% diabetes mellitus.

INTERVENTION(S) AND CONTROL GROUPS

Add groups if necessary

Group 1: Intervention

Brief description of the intervention	Intervention was based on the Life Span Theory of Control. The first 6 months of intervention consisted of four treatment components for specific targeted functional areas: education and problem solving; home modification; energy conservation techniques; and balance, muscle strengthening, and fall recovery techniques. The occupational therapist identified participants' problem areas during the initial meeting and evaluated the participants' safety and possible barriers to performance for each identified problem area. Subsequent sessions included providing strategies and equipment options to help overcome performance difficulties. During the fourth session, a physical therapist provided fall recovery techniques and balance and muscle strengthening. An occupational therapist conducted the fifth session over the telephone to reinforce strategy use. Home modifications were installed from the area agency on aging and the occupational therapist conducted the final session to review problem solving and strategy use, as well as provide resources and education. In the following 6 months, the occupational therapist made three additional telephone calls to reinforce strategies that were previously provided and a home visit was provided for closure. This program differed from traditional home care because the intervention addressed participants' prioritized problem areas. Traditional home care, on the other hand, focuses on areas that health professionals identify which may not reflect client priorities.
How many participants in the group?	160 participants
Where did the intervention take place?	Intervention took place in the participants' homes.
Who delivered?	Occupational therapists and physical therapist
How often?	The first 6 months included 5 90-minute visits, which consisted of 1 physical therapy visit, 4 occupational therapy visits, and 1 20-minute telephone contact. During the last 6 months, participants received 3 telephone calls from the occupational therapist, followed by a final home visit.
For how long?	12 months

Group 2: Control group

Brief description of the intervention	Participants were given educational materials on home safety and safe performance techniques at the end of the study.
How many participants in the group?	159 participants
Where did the intervention take place?	Baseline interviews were completed at the participants' homes.
Who Delivered?	Not stated
How often?	Not stated
For how long?	12 months

Intervention Biases: *Check yes, no, or NR and explain, if needed.*

Contamination:

YES ☐ NO ☐ NR ☒	*Comment:*

Co-intervention:

YES ☒ NO ☐ NR ☐	*Comment:* Yes, participants might have other interventions such as medication changes addressing their various conditions during the study period.

Timing:

YES ☒ NO ☐ NR ☐	*Comment:* A period of 12 months of intervention may lead to maturation because the natural process of physical and cognitive decline may occur with older adults over the course of the study.

Site:

YES ☒ NO ☐ NR ☐	*Comment:* Because intervention was carried out in individual participants' homes, site bias may be present because it may result in a higher level of satisfaction that favors the intervention group.

Use of different therapists to provide intervention:

YES ☒ NO ☐ NR ☐	*Comment:* The licensed occupational and physical therapists received 35 hours of training, and treatment implementations were monitored. They also attended supervision meetings every other week and investigators reviewed and provided feedback to the therapists after receiving their taped sessions. However, results could have been influenced because intervention styles may have been difficult to control.

MEASURES AND OUTCOMES

Complete for each measure relevant to occupational therapy:

Measure 1:

Name/type of measure used:	Standardized self-report of ADLs, mobility/transferring, IADL
What outcome was measured?	The self-report measured the participants' perceived difficulty on a 5-point scale from 1= "no difficulty" to 5= "unable to do because of health problems." The mean of all six items in each category represented the difficulty index for each category. ADLs included upper body dressing, lower body dressing, grooming, bathing/showering, toileting, and feeding. Mobility/transfer included getting in/out of car, walking indoors, walking 1 block, climbing 1 flight of stairs, moving in/out of chair, and moving in/out of bed. IADLs included light housework, shopping, preparing meals, managing money, telephone use, and taking medication. Cronbach alpha scores were reported as measures of internal consistency: ADL (Cronbach $\alpha = 0.67$), functional mobility (Cronbach $\alpha = 0.68$), IADL (Cronbach $\alpha = 0.58$).
Is the measure reliable?	YES ☐ NO ☐ NR ☒
Is the measure valid?	YES ☐ NO ☐ NR ☒
When is the measure used?	Three times: at baseline, 6 months, and 12 months

Measure 2:

Name/type of measure used:	Tinetti and colleagues' Falls Efficacy Scale and three items from Powell and colleagues' Activities-Specific Balance Confidence Scale (confident walking, up/down stairs, bending/picking up slipper from floor, getting into /out of car without falling)
What outcome was measured?	These standardized self-report scales measured the participants' perceived fear of falling. For each item, participant rated their fear of falling on a 10-point Likert scale. The mean of the total across 13 items represented the falling index. Cronbach alpha score was reported as measure of internal consistency: Cronbach $\alpha = 0.93$
Is the measure reliable?	YES ☐ NO ☐ NR ☒
Is the measure valid?	YES ☐ NO ☐ NR ☒
When is the measure used?	Three times: at baseline, 6 months, and 12 months

Measure 3:

Name/type of measure used:	The Home Environmental Assessment Protocol (HEAP)
What outcome was measured?	This assessment was used to identify 106 potential tripping and falling hazards (e.g., torn carpets, glare, lack of grab bars) via observation. The

	home hazard index represented the sum of potentially unsafe conditions. Cronbach alpha score was reported as measure of internal consistency: Cronbach α = 0.71.
Is the measure reliable?	YES ☒ NO ☐ NR ☐
Is the measure valid?	YES ☐ NO ☐ NR ☒
When is the measure used?	Twice: at baseline and 6 months

Measure 4:

Name/type of measure used:	Self-report of control-oriented strategies
What outcome was measured?	This investigator-developed assessment measured the participants' use of adaptive behavioral, cognitive, and environmental strategies on a 4-point scale. The average of the total across all 8 items represented the controlled-oriented strategy index. Cronbach alpha score was reported as measure of internal consistency: Cronbach α=0.69.
Is the measure reliable?	YES ☐ NO ☐ NR ☒
Is the measure valid?	YES ☐ NO ☐ NR ☒
When is the measure used?	Three times: at baseline, 6 months, and 12 months

Measurement Biases

Were the evaluators blind to treatment status? *Check yes, no, or NR, and if **no**, explain*.

YES ☒ NO ☐ NR ☐	*Comment:* The trained interviewers were blind to group assignment and study hypotheses.

Recall or memory bias. *Check yes, no, or NR, and if **yes,** explain*.

YES ☒ NO ☐ NR ☐	*Comment:* Self-reports are inherently subjective. This is further compounded by having participants reflect back on a longer time period, a period of 6 to 12 months, which additionally may skew or obscure the participants' memories.

Others (list and explain):

RESULTS

List key findings based on study objectives

Include statistical significance where appropriate ($p < 0.05$)
Include effect size if reported

After 6 months, the participants in the intervention group, when compared with the participants of the control group, had statistically significant reductions in difficulty with IADLs: p = .04, 95% CI [-.28, .00] and ADLs, p =.03, CI [-.24, -.01]. The largest reduction was in bathing, p =.02, 95% CI [-.52, -.06], and toileting, p = .049, CI [-.35, .00]. The intervention participants showed less difficulty in the mobility/transfer scores, but the difference was not statistically significant. The intervention participants further indicated increased self-efficacy, p = .03, 95% CI [.02, .27]; higher use of control-oriented strategies, p = .009, CI [.03, .22]; reduced fear of falling, p = .001, CI [.26, .96]; and had fewer home hazards, especially in the bathrooms, p =.05, CI [-3.06-.00]. Additionally, a greater proportion of the intervention participants improved in 11 of the 18 specific activities as compared to the control participants, with statistical significance for bathing, p =.04, grooming, p = .04, and preparing meals, p = .02. Furthermore, at 12 months, most of the benefits were retained. For three of the five primary outcomes (ADL and IADL functional difficulty, fear of falling) and for two secondary outcomes (home hazards and control-oriented strategy use), the results were similar to the 6-month outcomes. However, function-related self-efficacy dropped to half of the 6-month mark. Effect size for all treatment outcomes were small to medium (ranging from 0.19 to 0.26).
The total cost for the 6-month intervention per intervention participant was $1,222. The average cost for equipment and home modification, including devices, delivery, and installation, was $439. The therapy cost was $783 based on the Medicare reimbursement schedule for home care services ($25 per 15-minute therapeutic unit).

Was this study adequately powered (large enough to show a difference)? *Check yes, no, or NR, and if **no**, explain.*

YES ☒ NO ☐ NR ☐	*Comment:* Statistical calculations based on 90% power to detect medium effects in primary outcomes resulted in the need of 190 subjects. This study finished with 285 total participants.

Were appropriate analytic methods used? *Check yes, no, or NR, and if **no**, explain.*

YES ☒ NO ☐ NR ☐	*Comment:*

Were statistics appropriately reported (in written or table format)? *Check yes or no, and if **no**, explain.*

YES ☒ NO ☐	*Comment:*

Was the percent/number of subjects/participants who dropped out of the study reported?

YES ☒ NO ☐

Limitations:

What are the overall study limitations?

One limitation of this study is that it remains unclear if some component(s) of the intervention may be more effective than others. The researchers suggested that the positive results are due to the multicomponent approach and that participants themselves identified the problems to be targeted. Another limitation is the use of a non-treatment control group versus a different treatment control group to avoid the possibility that the therapists' attention may have been responsible for the different results. The use of only subjective self-report tools as the primary measurement instruments is another limitation. Future study should consider pairing objective and subjective indicators of function. Generalization to a wider population of vulnerable older adults may be limited, as the participation was on a voluntary base and participants may have been more motivated than non-volunteers would be.

CONCLUSIONS

State the authors' conclusions related to the research objectives.

This randomized controlled study provided evidence that an economical ($1,222 per patient) home intervention that combines occupational and physical therapy is effective in reducing perceived functional difficulties and home fall hazards in community-dwelling older adults with functional difficulties, resulting in improved quality of life and independence. The researchers found statistically significant reductions in difficulty in the areas of IADLs and ADLs, with the greatest improvements in bathing and toileting, and a decrease in home fall hazards, in comparison to a no-intervention control group. The intervention participants also showed less difficulty in functional mobility and transfers, and increases in self-efficacy and use of functional strategies, but these differences were not statistically significant. Most of the benefits were retained over a year.

Fear of falling is a strong risk factor for falling and functional decline. The intervention also showed reduction in fear of falling and can be used as an alternative to other group-based intervention to reduce fear of falling for people unwilling or unable to attend group sessions in the community.

This work is based on the evidence-based literature review completed by Liza Henty-Clark, OTS; Rosemarie Lion, OTS; Nadine Marcelo, OTS; and Kitsum Li, OTD, OTR/L, Faculty Advisor, Dominican University of California.