FOCUSED QUESTION
What is the impact of assistive technology and home modification interventions on ADL and IADL function in individuals aging with an early-onset long-term disability?


CLINICAL BOTTOM LINE:
The authors summarize the purpose of their research study as, “This study supports the value of assistive technology for adults aging with a disability and suggests that it be provided earlier in the aging process” (Wilson, Mitchell, Kemp, Adkins, & Mann, 2009). Occupational therapists are considered to be an assistive technology provider and thus should be knowledgeable of high-level research on the most appropriate use of products.

Assistive technology should be an intervention used by occupational therapists when working with clients who have early-onset lifelong physical disabilities as it may combat premature aging. In addition, assistive technology can be used to facilitate aging in place. As the aging population increases in future decades, there will be more clients approaching stages of normal functional decline as well as premature functional decline due to disabilities. Occupational therapists must be equipped with knowledge and evidentiary support to systematically select the most appropriate assistive technology to promote function in the aging population.

RESEARCH OBJECTIVE(S)
List study objectives.

- To investigate the impact of assistive technology and home modifications on individuals who are aging with early-onset lifelong physical disabilities
- To determine the importance of appropriate assistive technology provisions
- To identify factors to decrease functional decline in the aging population
- To decrease functional decline through modification of the physical environments of individuals experiencing the aging process
DESIGN TYPE AND LEVEL OF EVIDENCE:
Level I: Randomized controlled trial

Limitations (appropriateness of study design):
Was the study design type appropriate for the knowledge level about this topic? Circle yes or no, and if no, explain.

YES/NO

SAMPLE SELECTION
How were subjects selected to participate? Please describe.

Subjects were recruited from a previous study that occurred between 1999 and 2002. Recruitment for the previous study was not randomized. The sample was also selected via non-random sampling. Notices were sent to all participants in the previous study, to which they could respond with interest. 120 individuals qualified to be in the study sample.

Inclusion Criteria
Participants from the past study must have reported a need for assistive equipment. A physical therapist must have noted major muscle weakness, mobility problems, upper extremity pain or self-reported pain or fatigue that interfered with activities of daily living (ADL) and IADL (instrumental activities of daily living) performance.

Exclusion Criteria
NR

SAMPLE CHARACTERISTICS
N = 91

% Dropouts NR

#/ (%) Male 23 / 25.27%  #/ (%) Female 68 / 74.73%

Ethnicity 74 Caucasian, 9 Hispanic, 6 Pacific Islander, 2 African American

Disease/disability diagnosis Polio (n = 59), spinal cord injury (n = 13) rheumatoid arthritis (n = 9), “other” (n = 10; cerebral palsy, stroke, peripheral neuropathy)

Average disability duration: 45.4 years (SD = 19.2)

Check appropriate group:
< 20/study group 20–50/study group 51–100/study group 101–149/study group 150–200/study group
INTERVENTION(S) AND CONTROL GROUPS
Add groups if necessary

Group 1 – Intervention Group

<table>
<thead>
<tr>
<th>Brief Description</th>
<th>Participants randomly assigned to the control group (n = 47) received customized in-home evaluations of current assistive technology, physical environment, and performance, followed by allocation of additional assistive technology, home modifications, or task modifications; participants were trained in the use of the technology when necessary.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>Home environment of the participant</td>
</tr>
<tr>
<td>Who Delivered?</td>
<td>Occupational therapist and a 1st year equipment specialist student</td>
</tr>
<tr>
<td>Frequency?</td>
<td>Baseline, 12 months, and 24 months</td>
</tr>
<tr>
<td>Duration?</td>
<td>24 months</td>
</tr>
</tbody>
</table>

Group 2 – Control Group

<table>
<thead>
<tr>
<th>Brief Description</th>
<th>Participants randomly assigned to the control group (n = 44) received customized in-home evaluations of current assistive technology, physical environment, and performance; no assistive technology devices or home modifications were prescribed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>Home environment of the participant</td>
</tr>
<tr>
<td>Who Delivered?</td>
<td>Occupational therapist and a 1st year equipment specialist student</td>
</tr>
<tr>
<td>Frequency?</td>
<td>Baseline, 12 months, and 24 months</td>
</tr>
<tr>
<td>Duration?</td>
<td>24 months</td>
</tr>
</tbody>
</table>

Intervention Biases: Circle yes or no and explain, if needed.

Contamination

**YES/NO** The control group may have knowledge of assistive technology or have appropriate assistive technology or modifications in their homes prior to their participation in the research study.

Co-intervention

**YES/NO** It is possible for participants, in the control and intervention groups, to attend physician or therapy appointments outside of the study. Participants may have received education on or recommendations of assistive technology, home modifications, or task modifications that could cause change in function between the baseline, 12-month, and 24-month data collection points.

Timing

**YES/NO** T1 and T2 data collection points were a year apart. Although participants most likely will not experience maturation, functional decline, change in environment, or change in need may occur.
Participants were evaluated at their own homes, environments that the researchers cannot control, manipulate, or monitor at all times. Further, the variety of home layouts, neighborhoods, and architectural features is variable between each participant’s home.

Use of different therapists to provide intervention

**MEASURES AND OUTCOMES**

Complete for each relevant measure when answering the evidence-based question:

Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article – yes/no/NR [not reported]), and how frequently the measure was used.

1. Older Americans Resources and Services Instrument (OARS): In-person home interviews; measures level of independence in ADLs and IADLs; reported as reliable and valid; taken at baseline, 12 months, and 24 months
2. Functional Independence Measure (FIM): In-person home interview; measures functional change; satisfactory reliability and validity data; taken at baseline, 12 months, and 24 months
3. Telephone or email contacts: Measures average number of overnight stays in a health care facility and number of hours of in-home care; reliability and validity NR; taken monthly (data recorded at 12 and 24 months)
4. Self-report 41-item checklist: Measures number of assistive technology devices currently in use and change in number of devices; reliability and validity NR; taken at baseline, 12 months, and 24 months

**Measurement Biases**

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

**YES/NO** The researchers were aware of the status of participants as part of the intervention group and as part of the control group. As a result, researchers may have had greater motivation when prescribing assistive technology or home modifications to the intervention group in order to garner statistically significant results.

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

**YES/NO** Participants in both groups may recall past experiences with assistive technology, home modifications, or task modifications and may have self-implemented them during the study.

Others (list and explain):

**NR**
RESULTS
List results of outcomes relevant to answering the focused question
Include statistical significance where appropriate ($p < 0.05$)
Include effect size if reported

- Function in ADLs and IADLs of community mobility, bed transfers, bathing, and toilet care. **Baseline:** Treatment group had an average OARS score of 6.3 (SD = 1.5); control group had an average OARS score of 5.5 (SD = 2.2). **12 months:** Treatment group had an average OARS score of 5.9 (SD = 1.7); control group had an average OARS score of 5.2 (SD = 2.4). **24 months:** Treatment group had an average OARS score of 6.0 (SD = 1.7); control group had an average OARS score of 5.3 (SD = 2.5).

At 12 months, the treatment group had an average of 27 undesired outcomes and 102 desired outcomes, while the control group had 38 undesired outcomes and 75 desired outcomes in the four ADL and IADL areas listed ($X^2 = 4.32, p < 0.05$). At 24 months, the differences between groups followed the same pattern, but became less significant.

- **Baseline:** Treatment group had an average FIM score of 78.5 (SD = 13.0); control group received an average of 74.1 (SD = 18.3). **12 months:** Treatment group had an average FIM score of 79.2 (SD = 12.1); control group had an average of 71.8 (SD = 20.8). **24 months:** Treatment group had an average FIM score of 77.1 (SD = 13.4), control group an average of 71.3 (SD = 20.8). Non-significant results were found between the control and treatment groups at baseline ($t = 2.05, p < 0.05$)

- **Baseline:** N/A. **12 months:** Treatment group received an average of 6.8 (SD = 33.1) caregiver hours and 0.12 (SD = .29) facility visits; control group received an average of 15.5 (SD = 42.0) caregiver hours and 0.11 (SD = .27) facility visits. **24 months:** Treatment group received an average of 7.9 (SD = 36.4) caregiver hours and 0.21 (SD = .59) facility visits; control group received an average of 18.8 (SD = 48.0) caregiver hours and 0.12 (SD = .37) facility visits. There is a significant difference between caregiver hours of the control and intervention groups at 12 months ($F (1, 89) = 3.80, p < .05$), but there is no significant change in facility visits or caregiver hours between 12 months and 24 months for either group.

- **Baseline:** No differences in the number of assistive technology devices in use between the control and intervention groups. **12 months:** 94% of the intervention group and 0% of the control group received equipment from the study (50% of the control group obtained equipment on their own); $t = 5.8, p < .001$. **24 months:** 50% of the intervention group and 0% of the control group received additional equipment (36% of the control group obtained new equipment on their own); $t = 2.04, p < .05$.

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

**YES/NO** Power was calculated using a post-hoc power analysis. A moderate effect size of 0.3, sample size of $n = 91$, and $p = 0.05$ were used to calculate the power of the study design. Power was calculated as 0.908. The determined power is large enough to show a difference between groups.
 Were appropriate analytic methods used? *Circle yes or no, and if no, explain.*

**YES/NO**

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

**YES/NO**

**CONCLUSIONS**

State the authors’ conclusions that are applicable to answering the evidence-based question.

The authors conclude that the provision of assistive technology is correlated with higher levels of desired function in ADL and IADL tasks in clients with long-term, early-onset physical disabilities. The authors state that most (56.8%) of the assistive technology that was distributed was for the bathroom environment, an area where function can be severely limited. In addition, the authors conclude that normal functional decline occurred within both groups, even with the provision of assistive technology in the treatment group. However, functional decline was significantly slower in the treatment group, where appropriate assistive technology was prescribed. In the future, practitioners should provide assistive technology to clients earlier in the aging process.

Limitations of the study are reported as low external validity due to a non-randomized sample. The study should be used with the populations identified in the study. Furthermore, study participants in the control group had access to additional interventions and assistive technology. This limits the validity of the data used in the study’s analyses. Although the control group had access to publications and resources on assistive technology, professional in-home evaluations are vital for appropriate identification, installation, and training. Lastly, the author states that blinding was not maintained throughout the 2-year progression of the study. It is concluded that it is difficult to conduct a randomized controlled trial in a natural environment because there are many environmental factors that cannot be controlled by the researchers.

This work is based on the evidence-based literature review completed by Daniel M. Fichter, OTS, and Rondalyn Whitney, PhD, OT/L, Faculty Advisor, University of the Sciences in Philadelphia.


For personal or educational use only. All other uses require permission from AOTA. Contact: www.copyright.com