



HHS Public Access

Author manuscript

Am J Occup Ther. Author manuscript; available in PMC 2017 August 11.

Published in final edited form as:

Am J Occup Ther. 2012 ; 66(3): 292–300. doi:10.5014/ajot.2012.003053.

Effect of Occupation- and Activity-Based Interventions on Instrumental Activities of Daily Living Performance Among Community-Dwelling Older Adults: A Systematic Review

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Abstract

This systematic review examines the effectiveness of occupation- and activity-based interventions on community-dwelling older adults' performance of instrumental activities of daily living (IADLs). It was conducted as part of the American Occupational Therapy Association's Evidence-Based Practice Project. Forty studies met the inclusion criteria and were critically appraised and synthesized. Within occupation-based and client-centered interventions, the evidence that multicomponent interventions improve and maintain IADL performance in community-dwelling older adults is strong. The results also indicate that client-centered, occupation-based interventions can be effective in improving and maintaining IADL performance. The evidence is moderate for functional task exercise programs and limited for simulated IADL interventions to improve IADL performance. In the area of performance skills, the evidence related to physical activity and cognitive skills training is mixed, and the evidence that vision rehabilitation interventions improve IADL performance in older adults with low vision is moderate. Implications for practice, education, and research are also discussed.

Keywords

activities of daily living; community health services; occupational therapy; task performance and analysis; treatment outcome

The objective of this review was to identify, evaluate, and synthesize the research literature to address the following focused question: "What is the evidence for the effect of

occupation- and activity-based interventions on the performance of selected instrumental activities of daily living [IADLs] for community-dwelling older adults?" For the purpose of this review, the term *IADLs* refers to a variety of complex activities necessary to support daily life within the home and community, including home establishment and management, financial management, caregiving, meal preparation and cleanup, shopping, care of others, care of pets, child rearing, religious observance, communication management, safety and emergency maintenance, and community mobility (American Occupational Therapy Association [AOTA], 2008).

Background and Statement of the Problem

Older adults represent one of the fastest growing segments of the U.S. population (U.S. Census Bureau, 2004). An important public health goal for this population is maintaining their capacity to live independently and to function well (HealthyPeople.gov, 2012). The extent to which a person can continue to live independently depends largely on his or her ability to perform IADLs (Baker, 2005; Suchy, Williams, Kraybill, Franchow, & Butner, 2010). Limitations in IADLs are known to exist as a result of various neurodegenerative diseases; healthy community-dwelling older adults also exhibit considerable variability in their IADL skills (Burton, Strauss, Hultsch, & Hunter, 2006). In addition to a loss of independence, limitations in the ability to perform IADLs can eventually lead to decreased participation in everyday activities and may trigger the need for personal assistance or relocation to a family member's home or residential setting (Gill & Kurland, 2003). Moreover, difficulty in performing IADLs is associated with diminished quality of life, poor self-efficacy, and high health care costs and service utilization (Spillman, 2004).

Nevertheless, older adults prefer to live in their own homes, regardless of health issues or contextual barriers that may hinder their occupational performance (Gitlin, 2003). In addition, aging baby boomers expect professional care to be provided in communities rather than only in institutional facilities (Chen & Thompson, 2010). These trends will result in a greater demand for occupational therapy services targeted to community-dwelling older adults. Occupational therapy practitioners have the skills and knowledge to help community-dwelling older adults remain in their communities by collaboratively working with them and their families to overcome barriers that limit their performance and participation in IADLs.

A variety of activity- and occupation-based interventions address occupational performance limitations in IADLs. Nevertheless, which approaches are most effective in minimizing IADL performance difficulties remains unclear. Given the importance of IADL performance to independent and healthy living in old age, this evidence-based review examined occupation- or activity-based interventions targeted at improving or maintaining IADL performance in community-dwelling older adults. The effectiveness of specific activity- and occupation-based interventions for addressing IADL performance needs to be understood to improve clients' outcomes.

Method

The articles included in this review were the result of searches for articles published from 1990 to November 2008. Selected articles published in 2009–2011 were recommended by experts in the field and were reviewed for inclusion. We also reviewed bibliographies of selected articles for potentially relevant articles. Search terms for the review included *instrumental activities of daily living, activities of daily living, activity participation, home management, home maintenance, cooking, child rearing, grandparents, care givers, financial management, home maintenance, shopping, emergency, medical and communication services, safety, alarm systems, communication, assistive devices, communication devices, optical aids, wellness programs, and walking*. Articles selected for the review included studies that focused on older adults living in the community. In addition, the IADL interventions studied were within the scope of practice of occupational therapy and included an activity-based or occupation-based component. Performance outcomes included IADL performance and participation measurement tools as well as functional assessments, quality of life, and client-factor measures (such as muscle strength and self-efficacy) related to the performance of IADLs. Detailed information about the methodology and search terms for the review can be found in the article “Methodology for the Systematic Reviews on Occupation- and Activity-Based Intervention Related to Productive Aging” in this issue (Arbesman & Lieberman, 2012).

Results

This systematic review included a total of 38 studies—31 Level I articles, 3 Level II articles, 3 Level III articles, and 1 Level IV article. The articles were divided into five categories on the basis of type of intervention: occupation based and client centered, functional activities, performance skills, home modification and assistive technology, and driving. Because driving has been well covered in several other recent systematic reviews (Arbesman & Pellerito, 2008; Hunt & Arbesman, 2008; Kua, Korner-Bitensky, Desrosiers, Man-Son-Hing, & Marshall, 2007; Stav, 2008; Strong, Jutai, Russell-Minda, & Evans, 2008), those findings are not included in this article. Supplemental Table 1 (available online at <http://ajot.aotapress.net> [navigate to this article, and click on “supplemental materials”]) lists selected articles from this systematic review and provides the objectives, design, a description of the interventions and outcome measures, and summaries of the results and limitations for each study. The four programmatic categories included are

1. Occupation-based and client-centered interventions (interventions that are community based and delivered by occupational therapists or a team of providers, i.e., multicomponent interventions, Lifestyle Redesign® programs [Clark et al., 1997, 2011], and occupational therapy interventions)
2. Functional activities interventions (i.e., functional task exercise programs and simulated IADL programs)
3. Performance skills interventions (interventions that target specific performance skills, e.g., physical activity, cognitive skills, and vision rehabilitation)
4. Home modifications and assistive technology.

Occupation-Based and Client-Centered Interventions

We found 12 studies that addressed the effectiveness of occupation- and client-centered IADL interventions with community-dwelling older adults. Nine were Level I randomized controlled trials (RCTs), 1 was a Level II case-control design study, 1 was a Level III repeated-measures within-subjects design study, and 1 was a Level IV single-subject design study. We divided these studies into two areas: multicomponent interventions and occupational therapy interventions.

Multicomponent Interventions—Studies involving multicomponent interventions included interventions that were provided by more than one discipline (e.g., occupational therapy, physical therapy, nursing) and targeted a number of outcomes, such as activities of daily living (ADL) and IADL performance, falls efficacy, and habitual physical activity. Two Level I RCTs in three articles reported strong evidence that multicomponent interventions provided to older adults result in improved IADL performance. Gitlin et al. (2006) studied older adults with chronic conditions, and Zidén, Frandin, and Kreuter (2008) studied older adults recovering from hip fractures. In both studies, participants took part in home interventions, and the results indicated a reduction in older adults' perceived functional difficulties, improvement in confidence and independence in IADLs, and greater improvement in functional activities compared with those who did not receive the interventions. Gitlin et al. (2006) found these effects remained 6 mo postintervention. In addition, people 80 yr old and those with less education reported greater self-efficacy in managing IADLs than the control group (Gitlin, Winter, Dennis, & Hauck, 2008). The multicomponent interventions reported in these studies were brief (ranging from five to six therapy contacts).

Occupational Therapy Interventions—Included in this category were eight articles reporting on six studies that described Lifestyle Redesign interventions as well as other client-centered and occupation-based occupational therapy interventions provided to community-dwelling older adults. The evidence that the Lifestyle Redesign program, a lifestyle intervention provided by occupational therapists to slow age-related declines in older adults, improves IADL performance is mixed. The Level I Well Elderly study conducted with 361 older adults found that the Lifestyle Redesign program was effective in improving physical and role functions related to performance of some IADLs (Clark et al., 1997 Clark et al., 2001; Hay et al., 2002), had a long-term effect on these outcomes (Clark et al., 2001), and was cost effective (Hay et al., 2002) compared with social activity. Using the Lifestyle Redesign approach with a more ethnically diverse population and under less controlled experimental situations, the Well Elderly II study (Clark et al., 2011, a Level I RCT) did not find a difference between groups in improved physical function and role function related to performance of some IADLs. However, significant favorable change scores were found for the intervention group compared with the control group for bodily pain, vitality, and life satisfaction. In a Level I RCT of Lifestyle Redesign with 28 older adults in an adult day care program, Horowitz and Chang (2004) found no difference between treatment and control groups in role functioning and performance in IADLs.

Other studies found limited to moderate evidence for the effectiveness of client-centered occupational therapy home interventions in improving IADL performance in older adults. Hagsten, Svensson, and Gardulf (2006) provided occupational therapy to community-dwelling older adults after surgery for hip fracture in a Level I RCT conducted in Sweden. Although most of the intervention was provided in the hospital, a predischarge home visit was also included. Although no differences were found between the intervention and control groups at discharge and follow-up, significant differences were found between groups at 2 mo. Participants in the occupational therapy group reported significantly more indoor mobility, performance of light housework, and ease getting in and out of a car than did those in the control group. Fisher, Atler, and Potts (2007) conducted a Level II repeated-measures study that used the Occupational Therapy Intervention Process Model with 8 community-dwelling frail older adults and found that ADL motor ability significantly improved after intervention. In a Level II study of the effectiveness of an intervention for older adults with different functional abilities and with orthopedic, neurological, or chronic impairments, Matteliano, Mann, and Tomita (2002) found that participants who received occupational therapy services through a home care agency improved in the IADL of food preparation; however, the effect was not significantly different from that of the group that did not receive occupational therapy services. One Level IV study examined the effectiveness of an intervention for microwave oven use for meal preparation and found increased frequency of using cooking appliances and food items prepared and a reduction in the time spent preparing meals (Kondo, Mann, Tomita, & Ottenbacher, 1997).

Functional Activities Interventions

Studies examining interventions based on functional activities used targeted exercises or activities that simulated the conditions of daily tasks. We found 5 Level I RCTs and 1 Level III study that addressed the effects of functional activities interventions in the performance of selected IADLs. We divided these studies into two categories: functional task exercise programs and simulated IADL programs.

Functional Task Exercise Programs—Studies on functional task exercise programs reported on the effect of exercises such as transporting objects and moving objects from differing-height shelves as well as walking. Four studies (De Vreede, Samson, van Meeteren, Duursma, & Verhaar, 2005; De Vreede et al., 2004; Fisher & Li, 2004; Manini et al., 2007) found moderate evidence for the effectiveness of functional task exercise programs to improve IADLs. Two RCTs compared a functional task exercise program with a resistance exercise program in 122 older women (De Vreede et al., 2004, 2005). De Vreede et al. (2004) found that participants in both the functional task and the resistance exercise group significantly increased their functional task performance on several IADL tasks ($N = 24$). Although they found no significant differences between groups, effect sizes were greater for the functional task group. However, this study was likely underpowered to detect group effects.

A study with a larger sample size ($N = 98$) found that the functional task exercise group had significantly higher physical functional performance on several IADL tasks than the control

and resistance groups (De Vreede et al., 2005). Only changes in the functional task group were sustained after 7 mo of intervention.

Similarly, Manini et al. (2007) compared the efficacy of three interventions on the number of task modifications needed and timed performance on IADL tasks of 33 lower functioning older adults in a Level I RCT. Task modification can be considered an essential characteristic for identifying older adults at risk of subsequent disablement. After training, all groups showed similar reduction in task modification. However, only the two groups with functional training had a significant reduction in timed performance of functional IADL tasks. Additionally, a Level I RCT conducted with 582 community-dwelling senior residents found evidence of the effectiveness of walking programs to increase the IADL of neighborhood walking (Fisher & Li, 2004).

Simulated IADL Programs—Simulated IADL training programs are designed to mimic the performance of daily functional tasks, such as laundry and vacuuming. Limited evidence has been found for the efficacy of simulated functional IADL programs in older adults' IADL performance. Richardson, Law, Wishart, and Guyatt (2000) conducted a Level I study that compared a simulated home- and community-setting program with a traditional treatment setting in the clinic for patients with compromised functional status. Participants in both groups demonstrated little change in IADL performance during the intervention and 8 wk after discharge. A Level II study by Dobek, White, and Gunter (2007) compared the effectiveness of an IADL-based training program with a control period of no intervention in 14 independent-living older adults and found significant improvement in the ability to perform some IADLs and physical fitness.

Performance Skills Interventions

Studies included in this section reported on interventions targeting specific performance skills, such as motor (physical activity), cognitive, and sensory (vision) skills, and their impact on IADL performance. We reviewed 13 new studies and 3 previously reviewed studies related to performance skills interventions and IADL performance of older adults. Fourteen studies assessed physical activity interventions, 1 assessed cognitive skills, and 1 examined an intervention that targeted vision.

Physical Activity Interventions—The physical activity intervention studies included a systematic review, a meta-analysis, 10 Level I RCTs, 1 Level II study, and 1 Level III study. These studies assessed the effectiveness of general exercise programs, resistance training, aerobics, balance training, flexibility exercises, cardiorespiratory fitness, tai chi, and general physical activity sessions. The evidence that physical activity interventions improve IADL performance is mixed.

In a large Cochrane review of 121 RCTs, Liu and Latham (2009) found evidence supporting the effectiveness of progressive resistance strength training in improving older adults' strength and activity performance. Specifically, they found a positive impact on certain IADLs such as community mobility and preparing meals. Rejeski et al.'s (2008) Level I RCT ($N = 424$) found that participants in a physical activity intervention (400-m walk) had improved satisfaction with physical function and self-efficacy compared with an educational

control group. They suggested that physical activity might be effective for improving self-efficacy, satisfaction with physical function, and time spent on activities of moderate or greater intensity in older adults with mobility deficits. Ginis, Latimer, Brawley, Jung, and Hicks (2006) compared weight training and weight training plus education and found that both groups showed improvement in a 16.5-m walk at the end of the study in comparison with baseline performance. In a multisite study by Wellman, Kamp, Kirk-Sanchez, and Johnson (2007; $N = 620$), significant improvements in tasks related to community mobility (e.g., steps taken per day, number of days walked per week) were found after intervention (Level III study).

Three of the studies discussed earlier as functional activity interventions (De Vreede et al., 2004, 2005; Manini et al., 2007) also assessed interventions involving physical activity. These studies also supported the use of physical activities as effective means to improve IADL performance, even though they supported functional activity interventions over physical activities alone.

Several studies, including a meta-analysis and various RCTs, did not find a direct effect of physical activity interventions (e.g., general exercise programs, strength training) on older adults' IADL performance (Gu & Conn, 2008; Lee & King, 2003; Oida et al., 2003; Pahor et al., 2006; Rejeski et al., 2009; Timonen et al., 2006; Wellman et al., 2007; Wolf et al., 2003). However, several studies (Levels I and II) found significant differences between physical activity intervention groups and other intervention or control groups in functional and physical performance measures that are thought to be relevant constructs related to IADL performance (Gu & Conn, 2008; Pahor et al., 2006; Timonen et al., 2006). Timonen et al. (2006), for example, found changes in muscle strength, balance, and walking speed in an exercise group program but no changes in IADL performance as assessed by the Joensuu Classification. Pahor et al. (2006) found that a physical activity group had significantly higher scores on the Short Physical Performance Battery (Guralnik et al., 1994) than a health education control group after intervention.

In summary, some studies found direct evidence of improvement in IADL performance (such as community mobility, walking distances, preparing meals), and others did not find a direct effect of physical activity interventions. Various high-quality studies found improvement in functional performance and physical performance measures, which may or may not be related to IADL performance.

Cognitive Skills Intervention—The effects of training in memory, inductive reasoning, and speed of processing on daily functioning of community-dwelling older adults were studied in a large ($N = 2,832$), multisite Level I RCT (Willis et al., 2006). The study involved three cognitive training groups and a control group. Although all groups reported less difficulty with IADLs 5 yr after training, significantly less functional decline in IADL performance (including meal preparation, housework, finances, health maintenance, telephone use, and shopping) was found only in the group targeting inductive reasoning at the 5-yr follow up.

Vision Rehabilitation—Moderate evidence exists that vision rehabilitation improves function in adults with low vision. A Level I RCT (McCabe, Nason, Demers Turco, Friedman, & Seddon, 2000) provided multicomponent vision rehabilitation to older adults with low vision and examined whether an individual protocol ($n = 49$) or a family-focused protocol ($n = 49$) increased patients' functional abilities. The vision rehabilitation team included staff from optometry, occupational therapy, and social work. Regardless of group assignment, intervention was offered on the basis of patients' level of impairment and capacity. Changes in functional scores (i.e., decrease in dependence) and self-reported difficulty performing a task (e.g., preparing a meal, writing a check) were found in both groups using the Functional Assessment Questionnaire (Pfeffer, Kurosaki, Harrah, Chance, & Filos, 1982).

Home Modifications and Assistive Technology

No evidence exists that interventions related to the external physical environment (e.g., home adaptations) and the objects in them (e.g., assistive technology) support IADL performance. Mann, Ottenbacher, Fraas, Tomita, and Granger (1999; Level I RCT) assessed the effects of home modifications and the provision of assistive technology for 52 home-based frail older adults compared with 52 older adults who received standard care (control group). At 18 mo, the treatment and control groups showed differences in ADL performance on the FIM™ (Keith, Granger, Hamilton, & Sherwin, 1987) total score and motor score. In addition, they found a larger percentage of decline in IADL functional independence in the control group; however, this effect was not statistically significant. Fänge and Iwarsson (2005), in a Level III single-group study of housing adaptation, found that clients perceived that their housing environment supported daily activities to a greater extent at 2–3 mo after intervention than at baseline. However, they found no significant differences in IADL dependence and in usability of home modifications between baseline and 9 mo after intervention.

Discussion

Occupational therapy practitioners provide support to older adults as they stay active in many areas of IADL performance, including home maintenance, food preparation, shopping, community mobility, caregiving, financial management, and communication management. This review provides a synthesis of current evidence regarding interventions addressing IADL performance needs of community-dwelling older adults. The information not only is helpful to occupational therapy practitioners but also provides occupational therapy educators and researchers with evidence on IADLs that can be integrated into program curricula and research activities. For occupation-based and client-centered interventions, the evidence is strong that multicomponent interventions improve and maintain IADL performance in community-dwelling older adults. These interventions were more effective in people most vulnerable to functional decline (people 80 yr old and those with less education; Gitlin et al., 2008). The evidence for Lifestyle Redesign programs is mixed for IADL performance. The evidence that client-centered occupational therapy improves or maintains IADL performance in older adults living in the community is limited to moderate.

The evidence for functional task exercise programs is moderate, and it is limited for simulated IADL interventions to improve IADL performance.

In the area of performance skills, the evidence that physical activity programs improve IADLs is mixed. Also in the area of performance skills, the evidence that cognitive skills training affects IADL performance is limited. Moderate evidence exists that multicomponent vision rehabilitation that includes occupational therapy improves IADL performance in older adults with low vision. No difference in effectiveness, however, was found between individual and family-focused interventions in this population. No evidence exists that home modifications and assistive devices improve IADL performance in community-dwelling older adults.

According to the *Occupational Therapy Practice Framework: Domain and Process* (2nd ed.; AOTA, 2008), the activities included in IADLs are more complex than those included in ADLs. At one level, the complexity differs in the number of steps involved in completing an activity. For example, donning a shirt is less complex than preparing a family dinner. On another level, participation in an IADL differs from that in an ADL because of the involvement of social context and environment. Socioeconomic status, gender, prior IADL performance and responsibilities, living arrangements, and the availability of help all affect IADL performance in ways that may not occur for ADLs. For example, although dressing is something that most, if not all, older adults hope to accomplish independently, an older adult's perspective on being independent in meal preparation may not be the same. Although many older adults like to cook, others who were previously involved in cooking look forward to a time when their meal preparation time decreases and those tasks are completed by family members and others. These considerations are important to keep in mind when developing a client-centered occupational therapy plan of care and assessing related outcomes.

The systematic review presented here has several strengths. The methodology included a large time frame (since 1990) and incorporated several bibliographic databases, thus ensuring that relevant literature was captured. In addition, the articles in the review included a wide range of interventions. Of the 38 articles included in the review, 31, or 82%, were Level I evidence, and 89% were Level II or Level I evidence. Although studies at all levels may have limitations, those at Level I are less vulnerable to bias and more generalizable. In addition, the outcomes are more likely to be attributed to the intervention being studied.

Some of the articles included in this systematic review, however, had several limitations. Results should be interpreted with caution because the studies were conducted in a variety of settings and included participants with a wide range of functional abilities. We found considerable variability across the studies in relation to interventions examined and groups included. Interventions grouped under a single category (e.g., physical activities) included great variability in content, frequency, intensity, and context, making the articles difficult to synthesize. We also found an extensive diversity of IADL measures. The scarcity of commonly used observational and valid measures of IADL performance for older adults, as well as the extensive use of self-report IADL outcome measures in these studies, needs to be considered when appraising the results of these studies. Researchers in the area of ADL-

IADL measurement (Fieo, Austin, Starr, & Deary, 2011; Reuben et al., 2004) have indicated that many self-report measures were developed from the perspective of older adults with high levels of disability, many of whom were institutionalized. As a result, the use of these measures may lead to large ceiling effects for both ADLs and IADLs.

In addition, several studies were not blinded, had high dropout rates, and had small sample sizes. The studies were conducted in a variety of countries, and it is unknown whether differences in health care systems and service delivery had an impact on the design and implementation of the interventions. Finally, determining the contribution of individual components of multicomponent interventions is difficult.

Implications for Occupational Therapy Practice

The results of this systematic review have the following implications for occupational therapy practice:

- Occupational therapy practitioners, educators, and researchers need to use and develop comprehensive and sensitive measures that capture and report the whole scope of IADL outcomes in older adults living in the community.
- Strong evidence indicates that client-centered and activity-specific interventions in collaboration with other disciplines must be designed to improve IADL outcomes in older adults living in the community.
- Because improvement in physical performance does not always translate to improvement in IADL performance, occupational therapy researchers and practitioners must always assess how the impact of any intervention translates to meaningful occupational performance of older adults.
- There is a need to develop evidence for the use of assistive technologies, environmental modifications, and occupation-based and client-centered occupational therapy interventions to improve IADL outcomes in older adults with different functional abilities.
- Future research efforts must address the effects of occupation- and activity-based interventions on unexplored IADLs, such as financial management, caregiving, care of pets, child rearing, communication management, and safety and emergency maintenance. ▲

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

We acknowledge the contribution of Lismarie Torres, Jasmin Rivera, María Rivera, Mariela Sandoval, Marisol Pérez, Jo González, Sheila Millayes, Griselle Sánchez, Xiomara Cajigas, and Verónica Torres, all entry-level master's students, who collaborated in the initial appraisal of some of the studies reviewed for this article. We also acknowledge Karen Rivera for her assistance in the preparation of the evidence table and references for this article.

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