Interventions Within the Scope of Occupational Therapy Practice to Improve Performance of Daily Activities for Older Adults With Low Vision: A Systematic Review

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Importance: The prevalence of low vision increases with age. Low vision has detrimental effects on older adults' independence.

Objective: To identify the effectiveness of interventions within the scope of occupational therapy practice to maintain, restore, and improve performance in daily activities for older adults with low vision.

Data Sources: Literature published between 2010 and 2017 was searched in CINAHL, Cochrane Databases, MEDLINE, OTseeker, and PsycINFO.

Study Selection and Data Collection: The authors screened and appraised studies following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol. Studies were eligible if the participants' mean age was 55 yr or older, the level of evidence was Level III or higher, the intervention was within the scope of occupational therapy practice, and the outcome measures assessed the performance of daily activities.

Findings: Fourteen studies met the review criteria. Three intervention themes were identified: low vision rehabilitation services ($n = 6$), self-management approach ($n = 6$), and tango ($n = 2$). Moderate evidence was found for low vision rehabilitation services. Low evidence was found for using the self-management approach or adding the self-management approach to existing low vision rehabilitation services. Low evidence was found for tango.

Conclusion and Relevance: This systematic review supports the use of low vision rehabilitation services as an effective approach. Occupational therapy practitioners are encouraged to be part of multidisciplinary teams that offer comprehensive low vision evaluations and multicomponent services.

What This Article Adds: Low vision rehabilitation that offers multidisciplinary services, including occupational therapy, is effective in promoting independence among older adults with low vision.

Vision loss caused by age-related macular degeneration, diabetic retinopathy, and glaucoma is progressive and irreversible and often leads to low vision. *Low vision* refers to vision loss that results in difficulty in everyday life activities even with regular glasses, contact lenses, medicine, or surgery (National Eye Institute, 2018a). The prevalence of low vision increases drastically with age, from 1% of people in their late 60s to 17% of people in their 80s and older (National Eye Institute, 2018b). The adverse effects of low vision on older adults' independence and emotional health have been well documented (Brown et al., 2014; Kempen et al., 2012; Popescu et al., 2011; Taylor et al., 2016; van der Aa et al., 2015).

The top functional complaints among people with vision loss include difficulty reading, driving, recognizing faces, and performing in-home activities (Brown et al., 2014). Activities such as functional mobility, shopping, meal preparation, cleaning, and self-care are negatively affected (Taylor et al., 2016). Older adults with low vision report not only poorer performance in activities in daily living (ADLs) but also higher levels of depression and anxiety compared with older adults in the general population and with chronic conditions (Kempen et al., 2012). A population-based study

Citation: Liu, C.-j., & Chang, M. C. (2020). Interventions within the scope of occupational therapy practice to improve performance of daily activities for older adults with low vision: A systematic review. *American Journal of Occupational Therapy*, 74, 7401185010. <https://doi.org/10.5014/ajot.2020.038372>

showed that community-dwelling Medicare beneficiaries with vision impairment were more likely to be hospitalized than those without vision impairment (Bal et al., 2017). Clearly, the impact of vision loss on older adults' independence and quality of life is profound. Although the pathological process of low vision cannot be reversed by current surgical or medical procedures, the functional decline associated with low vision may be attenuated through nonsurgical intervention provided by occupational therapy practitioners.

A prior systematic review that examined the effectiveness of occupational therapy interventions in improving ADLs and instrumental activities of daily living (IADLs) in older adults with low vision identified a positive effect of using multicomponent approaches to increase knowledge and build skills to overcome the disablement process (Liu et al., 2013). The review also suggested that multiple sessions of training in the use of low vision devices and eccentric viewing are necessary to have a positive effect on clients' daily activity performance. One of the national vision health objectives in Healthy People 2020 is to increase vision rehabilitation services and comprehensive vision health services (U.S. Department of Health and Human Services, 2018). The demand for occupational therapy services for older adults with low vision will increase in parallel with the increased availability of vision rehabilitation and health services.

The purpose of this systematic review was to update the prior review and provide the most current empirical evidence to support occupational therapy practice in low vision rehabilitation. The question for the updated systematic review was, What is the evidence for the effectiveness of interventions within the scope of occupational therapy practice to maintain, restore, and improve performance in ADLs and IADLs for older adults with low vision?

Method

This systematic review is one of three updated reviews supported by the American Occupational Therapy Association (AOTA) as part of the Evidence-Based Practice (EBP) Project (see also Nastasi, 2020, and Smallfield & Kaldenberg, 2020, in this issue). The methods for the review were specified in advance and documented in a protocol followed by the authors.

Literature Search

The search terms were the same as those used in the last review (Liu et al., 2013; Table 1). These search terms were developed by the methodology consultant to the EBP Project and AOTA staff, in consultation with review authors and an advisory group. An experienced medical research librarian conducted the literature search in CINAHL, Cochrane Databases, MEDLINE, OTseeker, and PsycINFO. The search duration for published articles was set at January 2010 to January 2017, and the publication language was limited to English.

Literature Screening

The EBP Project methodology consultant reviewed the article titles and removed articles that were not relevant to the review before passing the search results to the authors. The two authors then individually screened each article title and abstract to determine eligibility. An article was included for further review if the average age of study participants was >55; the level of evidence provided was Level I (randomized controlled trials [RCTs], systematic reviews, or meta-analyses), Level II (nonrandomized studies with two or more groups), or Level III (one-group pretest–posttest studies); participants had low vision; the intervention was within the scope of occupational therapy practice; and the outcome measures assessed ADL or IADL performance. Articles were excluded if the publication format was a dissertation, thesis, or conference presentation or proceeding; the research design was not an intervention study; the intervention content was outside the scope of occupational therapy practice; or the publication language was not English. If the title and abstract did not provide sufficient information, the full text was retrieved for screening. Articles cited in the systematic reviews and meta-analyses included in the search results were also screened for eligibility.

Table 1. Search Terms for Daily Activity Performance for Older Adults With Low Vision

Category	Key Search Terms
Population	aging, elderly, older adults, seniors age-related macular degeneration, blindness, cataracts, central visual impairment, Charles Bonnet syndrome, diabetic retinopathy, dual sensory impairment, glaucoma, hemianopia, hemianopsia, light sensitivity, low vision, macula, macular edema, macular hole, oculomotor control, partial vision, partially sighted, peripheral visual impairment, photophobia, retina, retinitis pigmentosa, scotoma, Stargardt's disease, visual acuity, visual disorder, visual field, visual hallucination, visual impairment, visually impaired persons
Intervention	accessibility, activities of daily living, adaptive equipment, adult education, aging in place, ambient lighting, anxiety, assistive technology, audio device, bathing, behavioral activation, bifocals, bioptics, client education, closed circuit television (CCTV), cognitive behavior therapy, community mobility, compensation, compensatory techniques, computer tablet, contrast sensitivity, cooking, coping, cultural activities, dark-light adaptation, device training, depression, dressing, driving, driving restrictions, driving retirement, Dynavision, eating, eccentric viewing, education, electronic magnification, electronic reading device, electronic reading software, emergency preparedness, employment, environment, environmental modification, ergonomics, exercise, falls, fall prevention, family, fear of falling, field enhancement, field expansion, filtered lenses, foot care, friends, friendship, gardening, glare, glare control, handwriting, health literacy, health management, hobbies, illumination, instrumental activities of daily living, intervention, iPad, job, labeling, large print, laundry, leisure, leisure activity, lighting, loneliness, low vision devices, low vision rehabilitation, low vision training, magnification, meal preparation, medication management, meditation, mental health, microscopic glasses, MNRead acuity chart, mobile phone use, mobility, money management, nap, non-optical device, occupational therapy, optical device, optical magnification, optics, participation, Pepper Visual Skills for Reading Test, person environment fit, physical activity, preferred retinal locus training, prisms, problem solving, processing speed, psychosocial adaptation, reaction time, reading, reading comprehension, reading device, reading fluency, reading rate, reading speed, recreation, rehabilitation, relative distance, relative size, relaxation, rest, restrictive licensing, retirement, safety, scotoma awareness, self-management, sensory aids, shopping, sleep, sleep hygiene, social isolation, social participation, social support, socialization, spectral filters, spirituality, sports, stress, support system, tablet technology, tactile cues, tactile marking, task lighting, telephone, telescopes, television, toileting, traffic safety, transportation, travel, trip hazards, useful field of view, video magnification, visual cues, visual skills training, vision training, visual field, volunteer, watching television, wayfinding, web design, work, writing
Study and trial designs	appraisal, best practices, case control, case report, case series, clinical guidelines, clinical trial, cohort, comparative study, consensus development conferences, controlled clinical trial, critique, cross over, cross-sectional, double blind, epidemiology, evaluation study, evidence-based, evidence synthesis, feasibility study, follow-up, health technology assessment, intervention, longitudinal, main outcome measure, meta-analysis, multicenter study, observational study, outcome and process assessment, pilot, practice guidelines, prospective, random allocation, randomized controlled trials, retrospective, sampling, scientific integrity review, single subject design, standard of care, systematic literature review, systematic review, treatment outcome, validation study

Suggested citation: Liu, C.-j., & Chang, M. C. (2020). Interventions within the scope of occupational therapy to improve performance of daily activities for older adults with low vision: A systematic review (Table 1). *American Journal of Occupational Therapy*, 74, 7401185010. <https://doi.org/10.5014/ajot.2019.038372>

Articles that passed the initial screening were retained for full-text screening. The two authors used the same eligibility criteria for the full-text screening. Any discord in eligibility decisions was resolved through discussion between the authors.

Risk-of-Bias Assessment, Data Extraction, and Synthesis of Intervention Themes

The two authors independently rated the risk of bias of each eligible study using the Cochrane risk-of-bias guidelines (Higgins et al., 2011). The risk of selection bias, performance bias, detection bias, attrition bias, and reporting bias was rated as high, low, or unclear (Table 2, at the end of this article). The authors discussed any discord in bias rating until they reached a consensus.

After the risk-of-bias rating, the authors extracted and summarized study information, including level of evidence, research design, participant characteristics, intervention, outcome measures, and results, in an evidence table (Table 3, at the end of this article). One author extracted and entered the information, and the other checked the accuracy of the entered information.

The authors worked together to identify intervention themes in included studies. The strength of evidence in each intervention theme was rated as high, moderate, or low according to the grade definitions by the U.S. Preventive Services Task Force (2014). *High* strength of evidence indicates that the available evidence includes consistent results from well-designed, well-conducted studies and is unlikely to be strongly affected by the results of future studies. *Moderate* strength of evidence indicates that the available evidence is sufficient to determine the effects; however, confidence in the evidence is constrained by factors such as the number, size, or quality of individual studies; lack of coherence in the chain of evidence; or limited generalizability, and the magnitude or direction of the observed effect

could change when more information becomes available. Low strength of evidence indicates that the available evidence is insufficient to assess effects because of the limited number of studies, significant flaws in study design or methods, inconsistency of findings across studies, or limited generalizability.

Results

The database searches identified 10,549 records. After removing irrelevant articles and duplicates, the authors reviewed 469 titles and abstracts and excluded 433 articles. The authors then reviewed the full text of the remaining 36 articles. Fourteen articles met the inclusion criteria and were included in the final review. Figure 1 shows the flow of the articles through the literature screening and selection process.

The 14 articles include 6 Level I RCTs (Hackney et al., 2015; Pearce et al., 2011; Rees et al., 2015; Rovner et al., 2013, 2014; Stelmack et al., 2012) and 8 Level III studies (Alma et al., 2012; Coulmont et al., 2013; Goldstein et al., 2015; Hackney et al., 2013; Renieri et al., 2013; Ryan et al., 2013; Tay et al., 2014; Whitson et al., 2013). All trials included participants of both genders, and participants' mean age was in the 80s in 8 studies (Coulmont et al., 2013; Hackney et al., 2013, 2015; Rees et al., 2015; Rovner et al., 2013, 2014; Ryan et al., 2013; Whitson et al., 2013), in the 70s in 5

Figure 1. Flow of articles through the selection process.

Note. Figure format from “Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement,” by D. Moher, A. Liberati, J. Tetzlaff, & D. G. Altman; The PRISMA Group, 2009, *PLoS Medicine*, 6(7), e1000097. <https://doi.org/10.1371/journal.pmed.1000097>

Suggested citation: Liu, C.-j., & Chang, M. C. (2020). Interventions within the scope of occupational therapy to improve performance of daily activities for older adults with low vision: A systematic review (Figure 1). *American Journal of Occupational Therapy*, 74, 7401185010. <https://doi.org/10.5014/ajot.2019.038372>

studies (Alma et al., 2012; Goldstein et al., 2015; Pearce et al., 2011; Renieri et al., 2013; Stelmack et al., 2012), and in the 60s in 1 study (Tay et al., 2014). Four studies specified a low vision condition (i.e., age-related macular degeneration) as an inclusion criterion (Rovner et al., 2013, 2014; Stelmack et al., 2012; Whitson et al., 2013). The rest of the studies did not specify a low vision condition and recruited participants who attended low vision service clinics, met a specific visual acuity criterion, or had any visual impairment.

Intervention approaches were categorized into three themes: (1) low vision rehabilitation services (6 studies, 1,130 participants), (2) self-management approach (6 studies, 603 participants), and (3) tango (2 studies, 45 participants). Outcome measures that assessed ADLs or IADLs were almost exclusively self-reported. The National Eye Institute Visual Function Questionnaire 25-item version (NEI VFQ-25; Mangione et al., 2001) was the most frequently used outcome measure. Key findings are presented by intervention theme in the sections that follow.

Low Vision Rehabilitation Services

Studies that evaluated outcomes of low vision rehabilitation services provided in clinics include 2 Level I studies (Pearce et al., 2011; Stelmack et al., 2012) and 4 Level III studies (Coulmont et al., 2013; Goldstein et al., 2015; Renieri et al., 2013; Ryan et al., 2013). All studies were high in risk of selection bias, performance bias, and detection bias.

In the Level I study by Pearce et al. (2011), participants who received low vision rehabilitation services completed a low vision assessment (the modified Massof Activity Inventory, on which they rated their difficulty performing daily activities) and then visited an optician to review low vision devices and discuss problems noted at home and available services. An attention control group completed the same low vision assessment, but instead of visiting the optician, they visited a nurse who measured biometrics. Although both groups showed improvement on the selected outcome, there was no difference between the groups.

In the Level I study by Stelmack et al. (2012), participants received five weekly low vision rehabilitation therapy sessions and a home visit from a visual therapist who taught strategies for using remaining vision and low vision devices. Participants also completed 5 hr of homework each week. Intervention participants showed significantly higher visual ability as measured by the 48-item Veterans Affairs Low-Vision Visual Functioning Questionnaire at 4 and 12 mo than did wait-list control participants.

Two Level III studies examined low vision rehabilitation services provided by a multidisciplinary team that included an occupational therapist (Coulmont et al., 2013; Goldstein et al., 2015). Coulmont et al. (2013) found that the improvement on the Functional Global Profile was positively correlated with the number of direct service hours. Goldstein et al. (2015) found that half of participants showed a clinically meaningful difference as measured by the Activity Inventory and that the effect size of overall visual ability was large (Cohen's $d = 0.87$).

Two Level III studies (Renieri et al., 2013; Ryan et al., 2013) examined comprehensive low vision rehabilitation services that included some combination of vision assessment and education, fitting and training for magnifying devices and vision aids, advice about lighting and other methods of enhancing vision, suggestions for managing daily activities, and referral to additional services, reassessment, and follow-up. Both studies reported positive outcomes on the NEI VFQ-25.

Although 5 of the 6 studies in this theme showed positive outcomes for daily activity performance, the strength of evidence is weakened by the poor methodological quality of the studies. Thus, moderate strength of evidence supports using a multidisciplinary low vision rehabilitation team and a comprehensive low vision rehabilitation program to improve ADL or IADL performance.

Self-Management Approach

Three Level I studies (Rees et al., 2015; Rovner et al., 2013, 2014) and 3 Level III studies (Alma et al., 2012; Tay et al., 2014; Whitson et al., 2013) examined interventions using the self-management approach. The Level I studies had low

risk of bias in all categories, and the Level III studies had high risk of selection bias, performance bias, and detection bias.

Interventions in this theme shared the common feature of teaching study participants specific knowledge or a set of specific skills to manage problems related to vision loss as the problems arise. The interventions were not part of the usual low vision rehabilitation services participants received. Some interventions were multicomponent (Alma et al., 2012; Rees et al., 2015; Rovner et al., 2014; Tay et al., 2014; Whitson et al., 2013), and one had a single component (Rovner et al., 2013). Common intervention components across these studies included problem-solving skills (Alma et al., 2012; Rees et al., 2015; Rovner et al., 2013), goal-setting or goal-planning skills (Alma et al., 2012; Rees et al., 2015; Whitson et al., 2013), and encouragement of social connection (Alma et al., 2012; Rovner et al., 2014; Tay et al., 2014). These components were delivered weekly in a program format ranging in duration from 6 wk (Tay et al., 2014) to 20 wk (Alma et al., 2012). The interventions were delivered in a group (Alma et al., 2012; Rees et al., 2015; Rovner et al., 2013; Tay et al., 2014), individually in a one-on-one format (Rovner et al., 2014), or individually with the involvement of a friend or family member (Whitson et al., 2013).

Two Level I studies compared a self-management program combined with usual low vision rehabilitation services to usual low vision rehabilitation services alone (Rees et al., 2015; Rovner et al., 2014). Rees et al. (2015) examined an 8-wk self-management program focused on problem-solving skills training and goal planning added to usual low vision rehabilitation services, which offered an initial assessment by a multidisciplinary team member, an optometric assessment and prescription of optical aids, and further intervention by the multidisciplinary team. Rovner et al. (2014) evaluated outcomes from six in-home weekly occupational therapy sessions focused on behavior activation, which emphasizes the relationships among action, mood, and mastery and promotes self-efficacy and social connection as means to improve mood and function, added to usual low vision rehabilitation services, which offered assessments of vision function, prescription of devices, and device education. The combined intervention in both studies did not show significantly greater effects on the Impact of Vision Impairment Questionnaire (Rees et al., 2015) or on the Activities Inventory and the NEI VFQ-25 (Rovner et al., 2014), compared with those of usual low vision rehabilitation services alone.

In the other Level I study, Rovner et al. (2013) compared problem-solving therapy to supportive therapy, an attention control condition. The study did not detect a difference between the intervention group and the control group on the Targeted Vision Function or the NEI VFQ-25.

In a Level III study, Alma et al. (2012) evaluated an intervention delivered over 20 wk by a multidisciplinary group that included two occupational therapists. The intervention focused on four components: (1) practical skills training; (2) education, social interaction, counseling, and training in problem-solving skills; (3) individual and group goal setting; and (4) a home-based exercise program. In another Level III study, by Tay et al. (2014), an occupational therapist delivered a 6-wk intervention focused on understanding vision loss; maximizing remaining vision and using other senses; staying in touch with others; managing personal care, medication, money, and household; participating in daily activities and hobbies; and maintaining safety and mobility. Neither study found a significant improvement in ADL-related outcomes, measured by the Utrecht Scale for Evaluation of Rehabilitation–Participation (Alma et al., 2012) or the Low Vision Quality of Life Questionnaire (Tay et al., 2014), after program completion.

In another Level III study, Whitson et al. (2013) evaluated an intervention program that was modified to enable older adults with cognitive deficits to benefit from low vision rehabilitation. The modifications included offering frequent and repetitive training sessions, simplifying the training experience, and involving a friend or family member, and the intervention was delivered by an occupational therapist over 6 wk. The study identified a positive outcome on the NEI VFQ-25—satisfaction with the ability to perform IADLs—and timed activity performance measures after intervention.

In summary, the strength of evidence to support interventions using the self-management approach is low. These studies did not show benefits of the self-management approach, alone or combined with usual low vision rehabilitation services, in improving ADLs or IADLs in older adults with low vision.

Tango

One Level I study and 1 Level III study from the same research team examined the effectiveness of an adapted tango intervention in improving balance and reducing falls in older adults with visual impairments (Hackney et al., 2013, 2015). The adapted tango program consisted of 20 1.5-hr lessons over 12 wk in which participants were paired with partners without vision loss. Both studies had high risk of selection bias, performance bias, and detection bias. In the Level III study, a feasibility study, participants showed significant improvement on the NEI VFQ-25 after the program (Hackney et al., 2013). The Level I study compared the adapted tango program to a standard fall prevention exercise program (Hackney et al., 2015). Although participants in both programs showed a significant improvement on the NEI VFQ-25, the Level I study did not show a superior effect of the adapted tango program relative to that of the standard fall prevention exercise program.

In summary, the strength of evidence to support the use of a tango intervention to improve ADLs and IADLs in older adults with low vision is low. The strength of evidence is weakened by the limited number of studies and poor methodological quality.

Discussion

The purpose of this systematic review was to identify the effectiveness of interventions within the scope of occupational therapy practice to maintain, restore, and improve ADLs and IADLs for older adults with low vision. Fourteen studies were appraised, and three intervention themes were identified: low vision rehabilitation services, self-management approach, and tango. Moderate evidence was found in support of low vision rehabilitation services. Low evidence was found in support of the self-management approach and tango.

The themes of low vision rehabilitation services and the self-management approach overlap with the themes of multicomponent intervention, single-component intervention, and multidisciplinary intervention identified in the prior review (Liu et al., 2013). Low vision rehabilitation often involves a multidisciplinary team who offer comprehensive evaluations and multicomponent services. The self-management approach can entail a single-component intervention to equip clients with one specific skill or a multicomponent intervention to provide clients with various knowledge and skills. The prior review reported robust evidence in the multicomponent intervention and single-component intervention themes, particularly for interventions delivered over multiple training sessions. The prior review also reported moderate evidence in the multidisciplinary intervention theme.

The results of the current review are consistent with those of the prior review for the multidisciplinary intervention theme and support the positive effect of low vision rehabilitation services. However, the results of the current review for the self-management approach are not as positive as those of the prior review for the multicomponent or single-component intervention themes. The discrepancy may reflect the expansion of study population age and visual impairment conditions, and lack of sensitivity of the outcome measures used in the studies included in the current review.

A wide array of low vision rehabilitation services are available, ranging from simple provision of optical and nonoptical aids to more holistic and comprehensive approaches (e.g., integrated multidisciplinary services) and from one-time service visits to multiple service visits. Prior systematic reviews have shown robust effects of low vision rehabilitation services on vision-related daily task performance regardless of service model or content (Binns et al., 2012; Liu et al., 2013). For clients with mild visual impairments, basic low vision services, such as the prescription and provision of low vision devices, and comprehensive low vision rehabilitation services, such as low vision devices plus

training in device use or eccentric viewing and environmental modifications, have been found to yield equivalent ADL outcomes (Stelmack et al., 2017). For clients with more severe vision loss in the better-seeing eye, however, comprehensive low vision rehabilitation services have proved more beneficial than basic low vision services (Stelmack et al., 2017). Thus, providing basic low vision services to older adults with mild vision loss is fundamental to promote ADL independence, even when the service content is simple, whereas for clients with more severe vision loss, expansion of service content and involved disciplines is necessary. One caveat of research findings on low vision rehabilitation services in general is that most studies lacked a control group, which weakens the strength of evidence.

Earlier research has shown that self-management skill training improves ADL performance in older adults with age-related vision loss, specifically vision loss caused by macular degeneration (Eklund et al., 2004, 2008; Girdler et al., 2010; Lee et al., 2008; Packer et al., 2009). Common components of such programs include education about age-related macular degeneration, training in the use of low vision devices, training in problem-solving skills, and provision of low vision information and resources. The self-management studies included in this review expanded the inclusion criteria from older adults with age-related macular degeneration to those with any visual impairment (Alma et al., 2012; Rees et al., 2015; Tay et al., 2014). The self-management interventions thus were not tailored to participants' low vision condition, which may have weakened the interventions' effects (Rees et al., 2015). For example, a client with central vision loss may benefit from training in face recognition, whereas a client with peripheral vision loss may not. In addition, the expansion of the visual impairment conditions addressed also resulted in samples with a wider age range. For example, in two studies (Alma et al., 2012; Tay et al., 2014) that met the mean age inclusion criterion for this review, the lower value of the age range was in the 50s; adults in their 50s have different learning capabilities and require different self-management skills relative to adults in their 60s and older (Tay et al., 2014). The effect of the self-management interventions might have been stronger if needs and learning capabilities of different age groups were taken into consideration. In short, the low evidence identified for the self-management approach might reflect the researchers' interest in expanding the inclusion criteria to include participants with other visual impairment conditions, resulting in a heterogeneous sample who required self-management skill training tailored to each participant's vision condition and learning capacity.

Another reason for the low strength of evidence for the self-management approach is the lack of sensitivity of the outcome measure used (Alma et al., 2012; Rovner et al., 2014). Most studies used assessments of quality of life that include items addressing vision-related functional tasks, such as the NEI VFQ-25 (Mangione et al., 2001). Strictly speaking, vision-related quality of life assessments are not functional assessments (Ehrlich et al., 2017; Stelmack et al., 2002). Lack of sensitivity to detect change manifests through nonsignificant findings at the grand total score level but not at the item level (Alma et al., 2012; Rovner et al., 2014; Stelmack et al., 2002). For example, Rovner et al. (2014) found a significant change only in NEI VFQ-25 items assessing near vision activities. Moreover, setting individualized goals and working to achieve these goals are part of the self-management programs included in the review (Alma et al., 2012; Rees et al., 2015; Whitson et al., 2013), and the grand total score of a quality of life assessment might not be sufficiently sensitive to reflect improvements in these individualized goals.

Four studies that examined the self-management approach also reported high refusal rates of >40% by eligible participants (Rees et al., 2015; Rovner et al., 2013, 2014; Whitson et al., 2013). The high refusal rates are concerning because self-management is a new paradigm in health care to empower clients to be in charge of their own health. Rees et al. (2007) suggested that adults with low vision have low interest in participating in a self-management program because of time commitments, travel requirements, negative expectations, or perceived lack of need. The high refusal rate in Rovner et al.'s (2014) study might relate to the inclusion criterion of subthreshold depressive symptoms. Although self-management programs address emotional or psychosocial aspects of low vision and therefore may be more beneficial than low vision rehabilitation services alone (Rovner et al., 2014), lack of accessibility to such programs means that low vision rehabilitation services are the frontline treatment option for older adults with vision loss. Future

research should focus on increasing the accessibility and acceptability of self-management programs to older adults with low vision.

Although vision loss is a significant contributing factor to late-life disability, age-related decline in other body functions can accelerate the disablement process. Older adults with low vision also experience reduced endurance, mobility problems, and cognitive impairments (Goldstein et al., 2015). Vision loss, cognitive and physical decline, and participation restrictions create a vicious circle in which relinquishing valued activities because of low vision increases the risk of cognitive decline and falls, leading to further activity limitations (Lamoureux et al., 2010; Rovner et al., 2009). This review shows that researchers examining interventions for older adults with low vision have started to address cognitive and physical decline. Whitson et al. (2013) targeted people with low vision who also had cognitive deficits and included frequent and repetitive sessions, simplified training experience, and involvement of a companion in their self-management program. Alma et al. (2012) included home-based exercise in their self-management program, and Hackney et al. (2013, 2015) examined the effect of tango on balance and mobility. Still, few studies have targeted multiple declines in older adults with low vision, and future studies are needed that focus on a multifaceted approach addressing physical and cognitive decline in addition to vision loss to reduce functional decline in older adults with low vision.

Our review findings are partially consistent with a recent scoping review that identified effective interventions to facilitate the occupational engagement of older adults with age-related vision loss (McGrath et al., 2017). These interventions include self-management programs, compensatory interventions such as assistive device use, and social support. The differences in intervention themes and outcomes between the scoping review and this systematic review may be attributed to the different literature search period (2002–2015 vs. 2010–2017) and age cutoff (≥ 65 vs. ≥ 55). Our review indicates that the provision of assistive devices is often part of low vision rehabilitation services (Pearce et al., 2011; Renieri et al., 2013; Ryan et al., 2013; Stelmack et al., 2012) and that increasing social networks is often part of self-management programs (Alma et al., 2012; Rovner et al., 2014; Tay et al., 2014; Whitson et al., 2013).

Limitations

This systematic review has a few limitations. Given the wider age range we applied, participants in some studies may not have had age-related vision loss. In addition, although driving is an important IADL, we did not include any driving studies in this review because the samples in the located studies either were young adults or had conditions not limited to low vision.

Implications for Occupational Therapy Practice, Education, and Research

The findings of this review have the following implications for occupational therapy practice, education, and research:

- Basic low vision rehabilitation services, such as the provision of low vision devices, are effective to improve ADL performance in older adults with mild vision loss. Occupational therapy practitioners who are not low vision specialists can provide general services, such as home assessments, problem-solving training, or home exercise programs, to promote ADL performance in older adults with vision loss.
- Comprehensive low vision rehabilitation services are often provided by a multidisciplinary team. Occupational therapy education programs housed close to other vision care professional programs, such as optometry or ophthalmology, could initiate interprofessional education and practice collaboration. Such initiatives would build occupational therapy students' capacity to work with other low vision care professionals (Lucas Molitor & Mayou, 2018). Additionally, the curriculum could cover knowledge about how to apply general occupational therapy skills to better serve older adults with low vision.
- Performance-based vision-related occupational performance assessments that are sensitive to change are needed. An example is the Revised Self-Report Assessment of Functional Visual Performance (Snow et al., 2018;

Zemina et al., 2018), which includes a performance component. Performance-based assessments offer complementary information for evaluating intervention outcomes. Researchers in low vision are encouraged to include ADL and IADL measures or occupation-based performance assessments as functional outcome measures.

- Future research needs to continue examining the effectiveness of self-management programs for older adults with low vision. Specifically, the research focus could be shifted to what components to include to improve effectiveness and how to increase the accessibility and acceptability of such programs.

Conclusion

Low vision has detrimental effects on older adults' independence in ADLs and IADLs. This systematic review supports the use of low vision rehabilitation services as the primary mean to promote independence in older adults with low vision. Occupational therapy services should continue to be part of low vision rehabilitation services, which provide comprehensive low vision evaluations and intervention. Although low evidence was identified for the self-management approach alone or combined with low vision rehabilitation services, increasing access to self-management programs for older adults with more severe vision loss could increase the impact of such programs. This review also shows an emerging trend of expansion of low vision intervention content by considering cognitive decline and physical decline in addition to vision loss. This expansion includes developing effective modes of intervention delivery to older adults with low vision who also experience cognitive deficits, as well as adding a physical component, such as exercise or tango, to address physical decline in older adults with low vision. ■

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Acknowledgments

We thank Deborah Lieberman and Elizabeth Hunter for their guidance and support of this review.

Table 2. Risk-of-Bias Table

Citation	Selection Bias		Performance Bias: Blinding of Participants and Personnel	Detection Bias		Attrition Bias: Incomplete Outcome Data	Reporting Bias: Selective Reporting
	Random Sequence Generation	Allocation Concealment		Blinding of Outcome Assessment: Self-Reported Outcomes	Blinding of Outcome Assessment: Objective Outcomes		
Low Vision Rehabilitation Services							
Coulmont et al. (2013)	–	–	–	–	N/A	+	+
Goldstein et al. (2015)	–	–	–	–	N/A	–	+
Pearce et al. (2011)	?	?	+	–	N/A	+	+
Renieri et al. (2013)	–	–	–	–	N/A	–	+
Ryan et al. (2013)	–	–	–	–	N/A	?	+
Stelmack et al. (2012)	?	?	–	+	N/A	–	+
Self-Management Approach							
Alma et al. (2012)	–	–	–	–	N/A	–	+
Rees et al. (2015)	+	+	+	+	N/A	+	+
Rovner et al. (2013)	+	+	+	+	N/A	+	+
Rovner et al. (2014)	+	+	+	+	N/A	+	+
Tay et al. (2014)	–	–	–	–	N/A	+	+
Whitson et al. (2013)	–	–	–	–	N/A	+	+
Tango							
Hackney et al. (2013)	–	–	–	–	N/A	+	+
Hackney et al. (2015)	–	–	–	–	N/A	+	+
<i>Note.</i> Categories for risk of bias are as follows: + = low risk of bias; ? = unclear risk of bias; – = high risk of bias. N/A = not applicable because no objective outcome measures were used. Risk-of-bias table format adapted from “Assessing Risk of Bias in Included Studies,” by J. P. T. Higgins, D. G. Altman, and J. A. C. Sterne, in <i>Cochrane Handbook for Systematic Reviews of Interventions</i> (Version 5.1.0), by J. P. T. Higgins and S. Green (Eds.), 2011, London: Cochrane Collaboration. Retrieved from http://handbook-5-1.cochrane.org . Copyright © 2011 by The Cochrane Collaboration.							
<i>Suggested citation:</i> Liu, C.-j., & Chang, M. C. (2020). Interventions within the scope of occupational therapy to improve performance of daily activities for older adults with low vision: A systematic review (Table 2). <i>American Journal of Occupational Therapy</i> , 74, 7401185010. https://doi.org/10.5014/ajot.2019.038372							

Table 3. Evidence Table for Daily Activity Performance for Older Adults With Low Vision

Author/Year	Level of Evidence/Study Design/ Participants/Inclusion Criteria	Intervention and Control	Outcome Measures	Results
Coulmont et al. (2013)	Low Vision Rehabilitation Services			Number of direct service hours was significantly and positively correlated with Functional Global Profile scores.
	Level III 1-group, pretest–posttest $N = 100$ (M age = 81.8 ± 7.2 ; 76% female)	<i>Intervention</i> Rehabilitation program for visual impairment delivered by orientation and mobility specialists, occupational therapists, low vision educators, social workers, and others	Functional Global Profile	
	<i>Inclusion Criteria</i> Age ≥ 65 , enrolled in a rehabilitation program for visual impairment	<i>Control</i> No control		
Goldstein et al. (2015)	Level III 1-group, pretest–posttest $N = 441$ (M age = 73.9 ± 14.0 ; 69.4% female)	<i>Intervention</i> Low vision rehabilitation services including evaluation of visual function and evaluation and/or treatment by an occupational therapist, vision rehabilitation therapist, or other professional depending on the clinical site	Activity Inventory	Nearly half of participants showed clinically meaningful differences in overall visual ability after rehabilitation (Cohen's $d = 0.87$).
	<i>Inclusion Criteria</i> Age ≥ 18 , new patients at collaborating clinical centers	<i>Control</i> No control		
	Level I 2-group RCT $N = 96$	<i>Intervention</i> Low vision assessment plus 1-hr visit to an optician in the hospital to review low vision devices, discuss specific problems noted at home, and notify available services	Modified Massof Activity Inventory	
Pearce et al. (2011)	Intervention group, $n = \text{NR}$ (M age = 73.3 ± 0.7 ; 61% female)	<i>Control</i> Low vision assessment plus a well-person check with a nurse who measured height, weight, vision, and blood pressure		Both groups showed significant improvement, with no difference between groups.
	Control group, $n = \text{NR}$ (M age = 72.8 ± 0.6 ; 64% female)			
	<i>Inclusion Criteria</i> Age ≥ 18 yr, first-time attendee at a clinic for low vision assessments			
Renteri et al. (2013)	Level III 1-group, pretest–posttest $N = 50$ (M age = 75.0 ± 11.3 ; 46% female)	<i>Intervention</i> Low vision rehabilitation services involving an ophthalmological evaluation, fitting for magnifying devices and vision aids, education, and suggestions for managing daily activities	Modified German NEI VFQ–25	Participants reported significant improvement in scores on the Near Tasks subscale of the NEI VFQ–25.
	<i>Inclusion Criteria</i> Consecutive patients scheduled for outpatient low vision services	<i>Control</i> No control		

(Continued)

Table 3. Evidence Table for Daily Activity Performance for Older Adults With Low Vision (Cont.)

Author/Year	Level of Evidence/Study Design/Participants/Inclusion Criteria	Intervention and Control	Outcome Measures	Results
Ryan et al. (2013)	Level III	<i>Intervention</i> Community-based low vision services including assessment of participants' understanding of their ocular condition and prognosis, discussion of needs and initial goal setting, vision assessment, provision of low vision aids, suggestions for lighting and other methods of enhancing vision, provision of information on other rehabilitative services, and referral for additional services, reassessment, and follow-up	7-item NEI-VFQ	Participants showed a significant reduction in visual disability from baseline to 3 mo and from baseline to 18 mo.
	1-group, pretest–posttest			
	<i>N</i> = 343 (<i>Mdn</i> age = 82, range = 75–86; 72% female)			
	<i>Inclusion Criteria</i> Age >18, distance acuity of 6/12 or worse, near acuity of N6 or worse, requirement for low vision rehabilitation			
Stelmack et al. (2012)	Level I	<i>Control</i> No control	48-item Veterans Affairs Low-Vision Visual Functioning Questionnaire	A significant group difference was found in overall visual ability at 4 mo and 12 mo favoring the intervention group.
	2-group RCT	<i>Intervention</i> 5 weekly low vision rehabilitation therapy sessions and a home visit from a visual therapist who taught strategies for using remaining vision and low vision devices, plus 5 hr/wk of homework		
	<i>N</i> = 100			
	Intervention group, <i>n</i> = 44 (<i>M</i> age = 78.9 ± 6.6; 0% female)	<i>Control</i> Wait list; offered standard therapy after 4 mo		
	Control group, <i>n</i> = 56 (<i>M</i> age = 79.9 ± 6.7; 3.6% female)			
	<i>Inclusion Criteria</i> Age ≥65, macular disease, visual acuity in the better-seeing eye worse than 20/100 but better than 20/500			
Alma et al. (2012)	Self-Management Approach		Utrecht Scale for Evaluation of Rehabilitation–Participation	No significant results were found at the scale level. At the item level, a significant increase was found in frequency of engaging in chores in and around the house between pretest and 6-mo follow-up, and a significant decrease was found in restrictions in housekeeping between posttest and 6-mo follow-up.
	Level III	<i>Intervention</i> Multidisciplinary group rehabilitation program with 20 weekly group sessions focused on 4 components: (1) practical training (by occupational therapists); (2) education, social interaction, counseling, and training in problem-solving skills; (3) individual and group goal setting; and (4) a home-based exercise program		
	1-group, pretest–posttest			
	<i>N</i> = 26 (<i>M</i> age = 73.2 ± 8.0; 69% female)			
	<i>Inclusion Criteria</i> Age ≥55, referred to a low vision rehabilitation center per Dutch guidelines	<i>Control</i> No control		

(Continued)

Table 3. Evidence Table for Daily Activity Performance for Older Adults With Low Vision (Cont.)

Author/Year	Level of Evidence/Study Design/Participants/Inclusion Criteria	Intervention and Control	Outcome Measures	Results
Rees et al. (2015)	Level I	<i>Intervention</i> 8-wk group self-management program involving problem-solving skills training, goal planning, and usual low vision rehabilitation services	Impact of Vision Impairment Questionnaire	No significant between-group differences were found at 1-mo and 6-mo follow-up.
	2-group RCT <i>N</i> = 153			
	Intervention group, <i>n</i> = 93 (<i>M</i> age = 80.1 ± 8.1; 58.1% female) Control group, <i>n</i> = 60 (<i>M</i> age = 80.5 ± 8.1; 63.3% female)	<i>Control</i> Usual low vision rehabilitation services		
	<i>Inclusion Criteria</i> Age ≥55, independent, visual acuity of <6/12 and >6/480 in the better-seeing eye			
Rovner et al. (2013)	Level I	<i>Intervention</i> Problem-solving therapy teaching problem-solving skills in a structured way to enable participants to systematically identify problems, generate alternative solutions, select the best solution, develop and conduct a plan, and evaluate whether the problem is solved	• Targeted Vision Function • NEI VFQ-25	No significant between-group differences were found at 3 mo or 6 mo on either outcome measure.
	2-group RCT <i>N</i> = 141			
	Intervention group, <i>n</i> = 121 (<i>M</i> age = 82.7 ± 6.6; 67.8% female) Control group, <i>n</i> = 120 (<i>M</i> age = 82.8 ± 7.3; 59.2% female)	<i>Control</i> Supportive therapy, a structured, standardized psychological treatment		
	<i>Inclusion Criteria</i> Age ≥65, bilateral AMD, moderate difficulty in ≥1 valued vision-function goal			
Rovner et al. (2014)	Level I	<i>Intervention</i> Low vision rehabilitation services plus in-home behavior activation therapy, emphasizing the links among action, mood, and mastery and promoting self-efficacy and social connection as ways to improve mood and function and counter self-defeating behaviors, delivered by occupational therapists in 6 1-hr sessions over 8 wk, in addition to environmental modifications to improve function and action plans	• Activities Inventory • NEI VFQ-25	Activities Inventory scores improved in both groups at 4 mo, with no between-group difference. The intervention group improved significantly in NEI VFQ-25 Near Activities scores at 4 mo, with no between-group difference.
	2-group RCT <i>N</i> = 188			
	Intervention group, <i>n</i> = 96 (<i>M</i> age = 85.2 ± 6.6; 72.9% female) Control group, <i>n</i> = 92 (<i>M</i> age = 82.7 ± 6.9; 67.4% female)	<i>Control</i> Low vision rehabilitation services plus in-home supportive therapy emphasizing discussion of illness, disability, and vision loss, 6 1-hr sessions over 8 wk		
	<i>Inclusion Criteria</i> Age ≥65, bilateral AMD, visual acuity <20/70, moderate difficulty performing a valued vision-dependent activity, subthreshold depressive symptoms			

(Continued)

Table 3. Evidence Table for Daily Activity Performance for Older Adults With Low Vision (Cont.)

Author/Year	Level of Evidence/Study Design/ Participants/Inclusion Criteria	Intervention and Control	Outcome Measures	Results
Tay et al. (2014)	Level III 1-group, pretest–posttest $N = 9$ (M age = 63 ± 9.2 ; 44.4% female) <i>Inclusion Criteria</i> Age ≥ 50 , visual acuity worse than 6/24 with correction in the better-seeing eye	<i>Intervention</i> Singapore Low Vision Self-Management Program consisting of 6 weekly half-day group sessions led by an occupational therapist and focused on understanding vision loss; maximizing remaining vision and using other senses; staying in touch and communication; managing personal care, medications, and money; household management; participation in daily activities and hobbies; and safety and mobility <i>Control</i> No control	Low Vision Quality of Life Questionnaire	No significant difference was found between baseline and posttest.
	Level III 1-group, pretest–posttest $N = 12$ (M age = 84.5 ± 4.7 ; 75% female) <i>Inclusion Criteria</i> Age ≥ 65 , macular disease, cognitive deficits	<i>Intervention</i> Memory or Reasoning Enhanced Low Vision Rehabilitation program, consisting of twice-weekly face-to-face sessions over 6 wk with an occupational therapist in a quiet environment with a focused education agenda and the involvement of a cognitively and visually intact friend or family member to help participants achieve functional goals <i>Control</i> No control	<ul style="list-style-type: none"> • NEI VFQ–25 • Satisfaction with IADLs • Timed activity performance measures 	Significant improvements were found in NEI VFQ–25 Composite and Near Activities scores. Participants showed improvements in IADL satisfaction scores and significantly reduced time in activities including filling in a crossword puzzle answer and making a 4-item grocery list.
Tango				
Hackney et al. (2013)	Level III 1-group, repeated-measure $N = 13$ (M age = 86.9 ± 5.9 ; 53.8% female) <i>Inclusion Criteria</i> Age ≥ 75 , diagnosed with visual impairment, able to walk 10 ft with assistance	<i>Intervention</i> Adapted tango dance program in which participants were paired with partners without vision loss, 20 1.5-hr lessons over 12 wk <i>Control</i> No control	NEI VFQ–25	Significant improvements were found at program completion and 1-mo follow-up.

(Continued)

Table 3. Evidence Table for Daily Activity Performance for Older Adults With Low Vision (*Cont.*)

Author/Year	Level of Evidence/Study Design/ Participants/Inclusion Criteria	Intervention and Control	Outcome Measures	Results
Hackney et al. (2015)	Level I 2-group, repeated-measure RCT <i>N</i> = 32 Intervention group, <i>n</i> = 14 (<i>M</i> age = 84.9 ± 9.0; 50% female) Control group, <i>n</i> = 18 (<i>M</i> age = 74.8 ± 11.2; 56% female) <i>Inclusion Criteria</i> Age ≥50, diagnosed with eye pathology and/or visual acuity with presenting correction less than 20/60 in the better-seeing eye, able to walk 10 ft or more independently	<i>Intervention</i> Adapted tango program identical to the intervention in Hackney et al. (2013) <i>Control</i> FallProof™, a standard fall prevention protocol with lesson plans for specific exercises and progressions	NEI VFQ-25	Both groups showed significant improvement. However, no evidence was provided that tango was significantly more effective than FallProof.

Note. AMD = age-related macular degeneration; IADLs = instrumental activities of daily living; *M* = mean; *Mdn* = median; NEI VFQ-25 = National Eye Institute Visual Function Questionnaire-25; NR = not reported; RCT = randomized controlled trial.

Suggested citation: Liu, C.-j., & Chang, M. C. (2020). Interventions within the scope of occupational therapy to improve performance of daily activities for older adults with low vision: A systematic review (Table 3). *American Journal of Occupational Therapy*, 74, 7401185010. <https://doi.org/10.5014/ajot.2019.038372>