Methodology for the Systematic Reviews on Occupational Therapy Interventions for Older Adults With Low Vision

Marian Arbesman, Deborah Lieberman, Debra R. Berlanstein

Systematic reviews of the literature relevant to older adults with low vision are important to the practice of occupational therapy. This article describes the four questions that served as the focus for the systematic reviews of the effectiveness of occupational therapy interventions for older adults with low vision. We describe the background for the reviews; the process followed for each question, including search terms and search strategy; the databases searched; and the methods used to summarize and critically appraise the literature. In addition, we present the final number of articles included in each systematic review; a summary of the results, strengths, and limitations of the findings; and implications for practice, education, and research.


Occupational therapists and occupational therapy assistants, like many other health care professionals facing the demands of payers, regulators, and consumers, are increasingly required to demonstrate clinical effectiveness. In addition, they are eager to provide services that are client centered, supported by evidence, and delivered in an efficient and cost-effective manner. Over the past 20 yr, evidence-based practice (EBP) has been widely advocated as one approach to effective health care delivery.

Since 1998, the American Occupational Therapy Association (AOTA) has instituted a series of EBP projects to help members meet the challenge of finding and reviewing the literature to identify evidence and then use this evidence to inform practice (Lieberman & Scheer, 2002). Following the evidence-based philosophy of Sackett, Rosenberg, Gray, Haynes, and Richardson (1996), AOTA’s projects are grounded in the principle that the EBP of occupational therapy relies on the integration of information from three sources: (1) clinical experience and reasoning, (2) preferences of clients and their families, and (3) findings from the best available research.

A major focus of AOTA’s EBP projects is an ongoing program of systematic reviews of multidisciplinary scientific literature that use focused questions and standardized procedures to identify practice-relevant evidence and discuss its implications for practice, education, and research. The systematic reviews of literature relevant to low vision in older adults in this issue of the American Journal of Occupational Therapy (AJOT) strengthen our understanding of the foundations of this important area of practice.

Background

Low vision is generally defined as any visual impairment that cannot be corrected medically, surgically, or with conventional eyeglasses and results in a disability;
legal blindness is defined as acuity of 20/200 or worse or visual field of 20° or less (U.S. Department of Health and Human Services, 2004). Low vision or blindness is reported to affect 1 in 28 Americans older than age 40 (Congdon et al., 2004; Gohdes, Balamurugan, Larsen, & Maylahn, 2005). Although treatments exist to prevent or delay several of the vision problems that lead to low vision or blindness, the number of older adults living with low vision and blindness is expected to increase tremendously by 2020 (Congdon et al., 2004; Gohdes et al., 2005) as baby boomers reach the age of 65 and the longevity of older adults in general increases (Vladeck, 2005).

The prevalence of low vision and blindness increases as older adults age (Congdon et al., 2004; Dillon, Gu, Hoffman, & Ko, 2010). According to Congdon et al. (2004), 69% of people with blindness are age 80 or older. The prevalence of blindness increases from 0.15 per 100 people ages 60–64 to 6.82 per 100 people age 80 or older. With increasing age, the number of people with low vision increases from 0.53 per 100 people ages 60–64 to 16.05 per 100 people age 80 yr or older. By 2020, projections indicate that 3.9 million people (2.5%) will be living with low vision and 1.6 million people (3.6%) with blindness, for a total of 5.5 million visually impaired Americans (Congdon et al., 2004).

The four major causes of vision loss in older adults are age-related macular degeneration (AMD), glaucoma, diabetic retinopathy, and cataracts (Congdon et al., 2004; Horowitz, 2004). In addition to these eye conditions, refractive errors and other problems leading to visual impairment for people older than age 40 are reported to cost approximately $51.4 billion annually (Frick, Gower, Kempen, & Wolff, 2007; Rein et al., 2006), an estimate that includes the costs of medical care, the value of informal care, and productivity losses.

People with low vision and blindness experience a decreased ability to take part in meaningful activities (Burmedi, Becker, Heyl, Wahl, & Himmelsbach, 2002; Crews & Campbell, 2004; Girdler, Packer, & Boldy, 2008; Haymes, Johnston, & Heyes, 2002; Higgins & Bailey, 2000; Horowitz, 2004; West et al., 2002), and vision loss decreases participation in many areas of occupation: activities of daily living (ADLs), instrumental activities of daily living (IADLs), work, education, leisure, and social participation (AOTA, 2008). People with low vision are also reported to experience reduced quality of life (Berman & Brodaty, 2006; Desai, Pratt, Lenzner, & Robinson, 2001). An increased prevalence of depression is reported in older adults with low vision and blindness, particularly for those with vision changes from AMD (Burmedi et al., 2002; Casten, Rovner, & Tasman, 2004; Rovner & Casten, 2002). Given the number of older adults with low vision and blindness and the impact of low vision and blindness on occupational performance, it is important for occupational therapy practitioners to understand the evidence related to this area of practice.

According to Law and Baum (1998), evidence-based occupational therapy practice “uses research evidence together with clinical knowledge and reasoning to make decisions about interventions that are effective for a specific client” (p. 131). An evidence-based perspective is founded on the assumption that scientific evidence of the effectiveness of occupational therapy intervention can be judged to be more or less strong and valid according to a hierarchy of research designs, an assessment of the quality of the research, or both. AOTA uses standards of evidence modeled on those developed in evidence-based medicine. This model standardizes and ranks the value of scientific evidence for biomedical practice using a grading system based on the work of Sackett et al. (1996). In this system, the highest level of evidence, Level I, includes systematic reviews of the literature, meta-analyses, and randomized controlled trials (RCTs). In RCTs, participants are randomly allocated to either an intervention or a control group, and the outcomes of both groups are compared. Other levels of evidence include Level II studies, in which assignment to a treatment or a control group is not randomized (cohort study); Level III studies, which do not have a control group; Level IV studies, which use a single-case experimental design, sometimes reported over several participants; and Level V studies, which are case reports and expert opinion that include narrative literature reviews and consensus statements.

AOTA initiated and supported the systematic reviews in this issue of AJOT as part of the Evidence-Based Practice Project. In 2009, staff at AOTA headquarters and members expressed interest in developing an evidence-based practice guideline on occupational therapy for adults with low vision. They felt that the evidence-based practice guideline would provide occupational therapy practitioners with findings that would guide and support practice in this area and would support the role of occupational therapy to external audiences.

An advisory group of content experts in low vision within and outside of occupational therapy developed four focused questions for the systematic reviews of interventions for older adults with low vision included in this issue of AJOT:

1. What is the evidence for the effectiveness of environmental interventions within the scope of occupational therapy practice to maintain, restore, and
improve performance in ADLs and IADLs at home for older adults with low vision?

2. What is the evidence for the effectiveness of providing interventions within the scope of occupational therapy practice to improve the ability to use optical, nonoptical, and electronic magnifying devices to complete the reading required for performance of occupations by older adults with low vision?

3. What is the evidence for the effectiveness of interventions within the scope of occupational therapy practice to improve the driving performance and community mobility of older adults with low vision?

4. What is the evidence for the effectiveness of interventions within the scope of occupational therapy practice to maintain, restore, and improve performance in leisure and social participation for older adults with low vision?

Method

The consultant to the AOTA Evidence-Based Practice Project and AOTA staff developed search terms for the reviews in consultation with the authors of each question, and the advisory group reviewed the terms. The search terms were intended not only to capture pertinent articles but also to make sure that the terms relevant to the specific thesaurus of each database were included. Table 1 lists the search terms related to populations and interventions included in each systematic review. A medical research librarian with experience in completing systematic review searches conducted all searches and confirmed and improved the search strategies.

Databases and sites searched included Medline, PsycINFO, CINAHL, AgeLine, and OTseeker. In addition, consolidated information sources, such as the Cochrane Database of Systematic Reviews and the Campbell Collaboration, were included in the search. These databases contain peer-reviewed summaries of journal articles and provide a system for clinicians and scientists to conduct evidence-based reviews of selected clinical questions and topics. Moreover, reference lists from the articles included in the systematic reviews were examined for potential articles, and selected journals were hand searched to ensure that all appropriate articles were included.

Inclusion and exclusion criteria are critical to the systematic review process because they provide the structure for the quality, type, and years of publication of the literature incorporated into a review. The literature reviewed for all four questions was limited to peer-reviewed scientific literature published in English. The literature included in the review had been published since 1990, and the targeted study populations were older adults, primarily ≥65 yr old, with low vision. Studies included in the reviews evaluated intervention approaches that are within the domain and scope of practice of occupational therapy. The review excluded data from presentations, conference proceedings, non-peer-reviewed research literature, dissertations, and theses. Only Level I, II, and III evidence was included in the reviews.

The authors reviewed a total of 2,356 citations and abstracts. The searches resulted in 510 citations and abstracts related to ADL and IADL participation, 268 related to reading with magnifying and other devices, 973 related to driving and community mobility, and 605 related to leisure and social participation. The consultant to the EBP project completed the first step of eliminating references on the basis of an examination of citations and abstracts. Review teams of academic faculty working in partnership with occupational therapy graduate students completed the next step of eliminating references after further review of citations and abstracts. These teams retrieved the full-text versions of potential articles and determined final inclusion in the review on the basis of the predetermined inclusion and exclusion criteria.

A total of 70 articles were included in the final review. Table 2 presents the number and levels of evidence for articles included in each review question. The teams working on each focused question reviewed the articles to ascertain their quality (scientific rigor and lack of bias) and level of evidence. They then abstracted each article included in the review in an evidence table, providing a summary of the study’s methods and findings and an appraisal of its strengths and weaknesses in terms of design and methodology.

The strength of the evidence is based on the guidelines of the U.S. Preventive Services Task Force (2008). The designation of strong evidence indicates consistent results from well-conducted studies, usually at least two RCTs. A designation of moderate evidence indicates the presence of one RCT or two or more studies of lower levels of evidence. It may also reflect some inconsistency across individual studies that might preclude a classification of strong evidence. The designation of limited evidence indicates the presence of few studies, flaws in the available studies, and some inconsistency in findings across studies. A designation of mixed indicates that the findings were inconsistent across studies in a given category. A designation of insufficient evidence indicates that the number and quality of studies are too limited to make any clear classification.

Review authors also completed a Critically Appraised Topic (CAT), a summary and appraisal of the key findings, clinical bottom line, and implications for occupational therapy provided in the articles included in the
Table 1. Search Strategy for the Systematic Reviews on Interventions for Older Adults With Low Vision

<table>
<thead>
<tr>
<th>Category</th>
<th>Key Search Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>Aging, elderly, older adults, seniors plus age-related macular degeneration, cataracts, central visual impairment, diabetic retinopathy, glaucoma, hemianopia, hemianopsia, low vision, macula, neurological impairment, partial vision, peripheral visual impairment, retina, retinitis pigmentosa, Stargardt’s disease, visual disorders, visual fields, visual impairment, visually impaired persons</td>
</tr>
<tr>
<td>Intervention—participation in activities of daily living and instrumental activities of daily living</td>
<td>Activities of daily living (bathing, dressing, eating, toileting, walking), instrumental activities of daily living (cooking, shopping, medication management, telephone, money management), acoustic/audio cues, adaptive equipment, adaptive techniques, aging in place, ambient lighting, appliance marking, assistive technology, color, compensation, contrast, contrast sensitivity, dark–light adaptation, depression, eccentric viewing, environment, environmental intervention, environmental modification/adaptation, fall prevention, falls, glare, glare control, illumination, intervention, labeling, large print, life space, lighting, low vision rehabilitation, marking, mobility, occupational therapy, organization, pattern, quality of life, reading speed or rate, rehabilitation, safety, scotoma awareness, spectral filters, tactile cues, tactile marking, task lighting, trip hazards, vision training, visual cues, visual environment</td>
</tr>
<tr>
<td>Intervention—reading with magnifying and other devices</td>
<td>Activities of daily living, adaptive equipment, aging in place, assistive technology, audio device, bifocals, bioptics, client education, closed-circuit television (CCTV), contrast/contrast sensitivity, depression, device training, eccentric viewing, electronic magnification, electronic reading software/device, ergonomics, instrumental activities of daily living, large print, low vision aid, low vision rehabilitation, low vision training, magnification, medication label, microscopes along with glasses, microscopic glasses, MNRead Acuity Chart, nonoptical device, occupational therapy, optical device, optics, Pepper Visual Skills for Reading Test, portable electronic magnifiers, preferred retinal locus, prescription label, prisms, quality of life, reading and writing (menu reading, newspaper reading, recipe reading), reading comprehension, reading device, reading fluency, reading rate, reading speed, relative distance, relative size, scotoma awareness, sensory aids, spectacles, telescopes, video magnification, Web design</td>
</tr>
<tr>
<td>Intervention—driving and community mobility</td>
<td>AARP/CarFit, biopic driving, bioptic lens, bioptics, community mobility, community integration, contrast/contrast sensitivity, depression, driver training, driving, driving evaluation, field enhancement, field expansion, glare, intervention, low vision rehabilitation, prisms, processing speed, program effectiveness, quality of life, reaction time, restrictive licensing, traffic safety, transportation, transportation options for older adults, useful field of view, vision training, visual fields</td>
</tr>
<tr>
<td>Intervention—leisure and social participation</td>
<td>Accessibility, activity limitation, activity performance, adaptation, adaptive equipment, adjustment, adjustment to vision loss, assistive technology, community mobility, compensation, compensatory techniques, coping, cultural activities, daily living, depression, engagement/loneliness, environmental modification, environments, family, gardening, illumination, intervention, leisure (including specific leisure such as television watching, reading, travel, mobile phone use, mobility, access to transportation), leisure activity, leisure time physical activity, life satisfaction, longitudinal, mental health, occupational therapy, participation, passive leisure time, physical activity, problem solving, psychosocial adaptation, quality of life, recreation, recreational activity, rehabilitation, resources, scotoma awareness, socialization, social participation, social pursuits, social support, sports, stress, task lighting, vision-related quality of life, volunteer, well-being</td>
</tr>
</tbody>
</table>

Summary of the Reviews

The results of the systematic reviews published in this issue of AJOT provide important information for occupational therapy practitioners working with older adults with low vision. By reviewing the scientific literature broadly and appraising and synthesizing specific studies, the authors have provided up-to-date answers to critical questions that may previously have been informed primarily by clinical expertise.

Strong evidence exists that multicomponent programs improve performance of ADLs and IADLs for older adults with low vision (Liu, Brost, Horton, Kenyon, & Mears, 2013). The multicomponent programs examined in this review involved a number of interventions related to low vision, including education and exchange of information about low vision, training in problem-solving skills and relaxation techniques, and teaching in the use of low vision.

Table 2. Number of Articles in Each Review at Each Level of Evidence

<table>
<thead>
<tr>
<th>Review</th>
<th>Evidence Level</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>Total in Each Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation in activities of daily living and instrumental activities of daily living</td>
<td>9</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Reading with magnifying and other devices</td>
<td>16</td>
<td>8</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Driving and community mobility</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Leisure and social participation</td>
<td>9</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>
vision devices. Along with teaching multiple strategies and using multiple interventions, a key component of the multicomponent programs was that they occurred in small groups over multiple weeks. In most cases, homework was assigned to participants.

Mixed evidence was found for the effectiveness of single-component interventions in improving ADL and IADL performance for older adults with low vision (Liu et al., 2013). The single-component interventions studied included wearing prisms, eccentric viewing training, home visits, and lighting adjustment. In studies that implemented a multidisciplinary approach, more than one professional discipline participated in the intervention. Occupational therapists participated in four of the five studies included in this area. Although the evidence was mixed that multidisciplinary interventions improved ADL and IADL performance in older adults with low vision, the evidence was stronger for interventions tailored to participants’ goals.

Limited evidence supported the effectiveness of low vision devices over no device use in improving reading performance for older adults with low vision (Smallfield, Schaefer, & Myers, 2013). Low vision devices included nonilluminated and illuminated handheld or stand magnifiers, high-add spectacles, high-plus lenses, telescopes, and electronic magnifiers such as closed-circuit television. In comparisons of optical and electronic devices, moderate to strong evidence indicates that the use of stand-based electronic magnification systems improves reading performance, but limited evidence was found for the use of handheld electronic magnification, and mixed evidence was found for the use of spectacle reading glasses.

The evidence is strong that low vision rehabilitation programs that include an occupational therapy practitioner are effective in improving reading and reducing dependence in ADLs and other occupations (Smallfield et al., 2013). Studies providing occupational therapy services incorporated education, training in problem-solving strategies, and instructions in adaptive techniques.

Mixed evidence was found that low vision programs that did not include an occupational therapy practitioner were effective in improving reading performance. These studies did include components of low vision rehabilitation that are within the scope of occupational therapy practice, such as home visits and eccentric viewing training. Several studies evaluated the effectiveness of specific low vision strategies to improve reading. Moderate evidence supports the influence of illumination on reading speed, but no evidence supports a particular light source. The evidence was insufficient for the effectiveness of serif or sans serif typefaces in promoting the legibility of print. Limited evidence supports eccentric viewing for reading. No evidence was found to support the use of a colored overlay to improve reading, provision of a large-print reading program before learning how to use an optical magnifier, or use of a line guide with a stand magnifier.

Strong evidence indicates that using a problem-solving or self-management approach improves leisure and social participation in older adults with macular degeneration (Berger, McAteer, Schreier, & Kaldenberg, 2013). The evidence was moderate that an interdisciplinary approach combining a variety of services improved leisure and social participation. Mixed results were found for studies using training in specific skills (e.g., scanning, eccentric viewing, use of magnification) to improve leisure and social participation. Mixed evidence was also found that home visits and environmental adaptations provided during those visits resulted in improvements in leisure and social participation.

The evidence is insufficient for the effectiveness of interventions for driving and community mobility for older adults with visual impairments (Justiss, 2013). Limited evidence indicates that simulator training reduced collisions, crashes into pedestrians, and total faults in older adults with low vision driving in simulated conditions. Moderate evidence was found that self-regulatory behavior and self-awareness improved after a driver education program, but no evidence was found that the number of crashes was reduced. At this time, the evidence that community mobility training as part of a multidisciplinary program improves community mobility is insufficient. Limited evidence indicates that training with bioptic telescopes improves recognition, peripheral identification, and scanning but has no effect on mobility, tracking, or visual memory. At this time, no evidence supports the use of prisms or bioptic amorphous lenses in improving driving safety.

Strengths and Limitations of the Reviews and Implications for Practice, Research, and Education

The systematic reviews presented in this issue of AJOT cover many aspects of occupational therapy practice for older adults with low vision and have a number of strengths. Four focused questions were included in the reviews, covering information related to several aspects of the domain of occupational therapy addressed within the Occupational Therapy Practice Framework: Domain and Process (2nd ed.; AOTA, 2008). The reviews included 70 articles, and three-fourths of the articles provided Level I and II evidence. The reviews involved systematic methodologies and incorporated quality control measures. The individual systematic reviews
provide complete information on the results and their implications.

Limitations of many of the studies incorporated in the reviews include small sample size and lack of long-term follow-up. As indicated by the level of evidence, some studies lacked randomization and a control group. In some cases, review authors were unable to separate the effects of a single intervention that was part of a multimodal intervention. Also, many of the studies used outcome measures that were not specifically geared to the systematic review question, which may have obscured the review authors’ ability to separate out the effect of the interventions studied on the targeted outcome.

The systematic reviews presented in this issue provide summaries of the best scientific literature available to answer the focused questions. Occupational therapists can integrate the results of the reviews directly into their clinical practice by combining the scientific evidence with their own clinical expertise and with client preferences. In addition, practitioners can use this information when advocating for occupational therapy services to a payer, regulator, or other professional or when providing information and support to a client and family member at any point during the intervention process.

Future research should build on the existing studies discussed in the systematic reviews included in this issue. Clinical researchers need to be familiar with the most recent work to incorporate the results into future research plans. Clearly, more work is needed to definitively answer the four questions that served as the basis of these systematic reviews. Although some future research can be conducted in isolation, research questions in the areas of low vision with older adults are often complex and may best be answered through collaborative research with other disciplines working with older adults with low vision, such as low vision optometrists, social workers, orientation and mobility specialists, vision rehabilitation therapists, and ophthalmologists. This collaboration should begin in the planning stages to ensure the design of well-controlled research projects that incorporate the role of occupational therapy and a client-centered and occupation-based perspective.

The future of occupational therapy depends on all occupational therapy practitioners developing a firm grasp of the best available evidence. This agenda is also clear for academic programs training the next generation of occupational therapy practitioners. Educators need to be aware of the results of the systematic reviews and to present this multifaceted information to students. In addition, the evidence should be presented not in a one-size-fits-all framework, but rather from a client-centered and occupation-based perspective, as described in the Framework (AOTA, 2008).

The Centennial Vision for AOTA (2007) looks to a future in which occupational therapy meets society’s needs by being a powerful, science-driven, and evidence-based profession. Although the results of these systematic reviews have wide-ranging implications for occupational therapy, the Centennial Vision indicates that the most important target audiences for these reviews are older adults with low vision. ▲

References