Focused Question

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

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Collaborators

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• Acknowledgement
  – Jennifer Kaldenberg, MSA, OTR/L, SCLV, FAOTA

Academic Partnership Arrangement

• Master’s Project for two USDOT students
• Abstract review was completed collaboratively
• Select CAPs were prepared by students under faculty mentorship
• Evidence table completed individually then combined and edited by faculty mentor
• CAT was prepared by students and by faculty mentor

Significance

• The number of older adults with low vision is on the rise.
• Many daily activities require reading performance
  – Reading performance is a common therapeutic goal
• Occupational therapy intervention for low vision commonly includes training in the use of optical and electronic magnification and strategies to maximize reading performance.

Scope of the Question

• Population:
  – Older adults with low vision
• Intervention:
  – Within the scope of occupational therapy practice
  – Optical
  – Non-optical
  – Electronic magnification
• Outcomes:
  – Reading required for performance of occupations

Search Process

Librarian Searches
• Medline = 121
• Cochrane = 47
• PsycINFO = 17
• AgeLine = 36
• CINAHL = 47
• Total = 268

Additional Searches
• Referrals from other focused questions
• Hand search of journals
• Hand search of references

Master Citation Table
• Total: 76 articles
• Discarded: 44
• Included: 32
Search Results

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Number of Studies</th>
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<tbody>
<tr>
<td>Level I</td>
<td>18</td>
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<tr>
<td>Level II</td>
<td>7</td>
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<tr>
<td>Level III</td>
<td>7</td>
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Results by Theme

- Effectiveness of low vision devices (5)
- Comparison of optical and electronic magnifying devices (5)
- Effectiveness of low vision rehabilitation programs that include OT (5)
- Effectiveness of low vision rehabilitation programs that do not include OT but are within scope of OT practice (5)
- Effectiveness of low vision strategies (13)

Results by Theme (cont'd)

- Effectiveness of low vision strategies
  - Illumination (5)
  - Text characteristics (1)
  - Viewing techniques (4)
  - Overlays (1)
  - Large print reading home program (1)
  - Line guide in an optical magnifier (1)

Effectiveness of Low Vision Devices

- 2 level II studies; 3 level III studies
- Limited evidence demonstrating LVD improve reading ability
  - 2 level II studies found no difference in reading rates with and without a LVD at critical print size (Bowers, Lovie-Kitchin, et al., 2001; Cheong et al., 2005)
  - 3 level III studies found increased ability to read with a LVD (Horowitz et al., 2006; Margrain, 2000; Nguyen et al., 2009)
- Variable definitions of LVD; largely optical
- Higher levels of evidence needed in this theme

Comparison of Optical and Electronic Magnifying Devices

- 4 level I RCTs; 1 level II study
- Strong evidence for the use of stand-based electronic magnification systems over others
  - Reading rate (Goodrich & Kirby, 2002; Goodrich et al., 2004; Peterson et al., 2003; Steinmack et al., 1991)
  - Reading duration (Goodrich & Kirby, 2002; Goodrich et al., 2004; Steinmack et al., 1991)
- Limited evidence that handheld electronic magnification is more beneficial than a prescribed optical device (Goodrich & Kirby, 2002)

Comparison of Optical and Electronic Magnifying Devices (cont'd)

- Conflicting evidence regarding use of spectacle reading glasses (Culham et al., 2004; Steinmack et al., 1991)
- More evidence needed regarding head-mounted electronic magnification systems
  - 1 level II study shows they are less effective than optical magnifiers for reading speed (Culham et al., 2004)
- One size does not fit all
Effectiveness of Low Vision Programs that include OT

- 4 level I RCTs; 1 level III study
- Strong evidence that low vision programs that include OT are effective
  - Decreased dependence in ADL (Eklund & Dahlin-Ivanoff, 2007; Eklund et al., 2008; McCabe et al., 2000; Pankow, 2004)
  - Increased visual capacity (McCabe et al., 2000)
  - Maintain ability to perform occupations over a 28-month period of time (Eklund et al., 2008)
  - Improved ability to read medication labels (Markowitz et al., 2008)

Effectiveness of Low Vision Programs that do not include OT

- 3 level I RCTs; 1 level II study; 1 level III study
- Limited evidence of effectiveness compared to no intervention (Stelmack et al., 2008)
- Conflicting evidence of effectiveness compared to alternative intervention (Goodrich et al., 2006; La Grow, 2004; Reeves et al., 2004; Scanlan & Cuddeford, 2004)
- Outcome measure of reading performance

Effectiveness of Low Vision Strategies Illumination

- 3 level I RCTs; 2 level II studies
- No evidence to support a particular type of light source (Eperjesi et al., 2007; Haymes & Lee, 2006)
- Moderate evidence to support the influence of illumination on reading speed (Bowers, Meek, et al., 2001; Eldred, 1992)
  - Older adults with low vision require illumination levels of 1000 - 7000 lux (Bowers, Meek, et al., 2001; Eldred, 1992)
  - Participants often prefer less than optimal levels of illumination (Bowers, Meek, et al., 2001)
  - Optimal illumination levels should be determined individually (Eldred, 1992; Fosse & Valberg, 2004)

Effectiveness of Low Vision Strategies Text Characteristics

- 1 systematic review of largely level II studies (Russell-Minda et al., 2007)
  - 18 studies in the systematic review; no RCTs
- Inconclusive evidence in regard to serifs
  - Subjective preference for sans serif fonts
- No published guidelines regarding a standard font size for published low vision materials
  - Typefaces such as Arial, Veranda, Helvetica, and Adsans are more readable than Times New Roman
  - Font size should be at least 16- to 18-point type

Effectiveness of Low Vision Strategies Viewing Techniques

- 3 level I RCTs; 1 level III study
- Limited evidence supporting eccentric viewing completed with specific computer software programs for near vision and ADL (Frennesson et al., 1995; Vukicevic & Fitzmaurice, 2005; Vukicevic & Fitzmaurice, 2009)
- Limited evidence to support eccentric viewing in combination with instruction in magnification (Vukicevic & Fitzmaurice, 2005)
- No evidence to support binocular or monocular viewing in favor of the other (Kabanarou & Rubin, 2006)

Effectiveness of Low Vision Strategies Overlays

- 1 level I RCT
- No evidence supporting the use of a colored overlay to improve reading for the performance of daily occupations (Eperjesi et al., 2004)
  - No relationship between reading rate and filter color
  - Rose, purple, and blue overlays have poorer reading rates as compared to other filter colors
Effectiveness of Low Vision Strategies

Large Print Reading Home Program
• 1 level II study
• No support for the use of a large print reading home program prior to learning how to use an optical magnifier (Cheong et al., 2005)
  – Reading rates significantly improved for all groups; no difference in reading rates between groups

Effectiveness of Low Vision Strategies

Line Guide in an Optical Magnifier
• 1 level III study
• Not enough evidence to support or refute the effectiveness of using a line guide within an optical magnifier during reading tasks (Cheong et al., 2009)
  – Use of a line guide resulted in a small decrease in reading speed but 48% of participants preferred using it

Limitations
• Low number of participants in 9/32 studies
• Variation in low vision rehabilitation programs
• Variation in research interventions across studies
• Variation in the ADL outcome measures used
• Generalizability limited by homogeneous sample
• Some themes have only one study or only studies of low methodological quality

Implications for Practice
• Low vision intervention should include:
  – Occupational therapy as part of the team
  – Training in electronic magnification
  – Adequate illumination levels
  – Training in optical magnifiers
  – Eccentric viewing
• No evidence or inconclusive evidence to support:
  – A particular type of light source
  – A particular type of font
  – Overlays

Implications for Education
• Education needed in:
  – Electronic magnification options
  – The importance of lighting on the performance of reading required for daily occupations
  – Eccentric viewing techniques
    • Computer-based training programs
  – Optical magnification as needed
  – Client-centered, occupation-based intervention

Implications for Research
• More research needed:
  – Low vision services provided by occupational therapy practitioners
  – Effectiveness of optical magnifiers
  – Development of “standard” low vision care
  – Text characteristic preferences
  – Line guides within optical magnification
Conclusion

- Interventions within the scope of OT improve the ability to complete the reading required for performance of occupations by older adults with low vision:
  - Low vision programs that include OT services
  - Electronic magnification
  - Illumination
  - Eccentric viewing training
  - Optical magnification