CONCLUSIONS

The pilot study demonstrated the utility of filling gaps in information in situ, compared with the provision of information prior to walking a route. Furthermore, when expediency in reaching a destination is the goal, participants want information that is specific to that purpose: "left" ("right" or "straight") and directional information at decision points (such as hallway intersections) and a short description of how to locate the destination door (for example, "Destination: next door on left when approaching the destination"). The provision of any other type of information is perceived as a nuisance or distraction.

However, the participants' responses also seem to indicate a need to provide different types of information under different circumstances. The participants asked for the ability to choose from among different types of information according to the situation and objective. For instance, some wanted to be able to explore new spaces using a device, such as a global positioning system (GPS), that can help them find specific landmarks, create GPS-like "points of interest," and provide overview descriptions that are useful in forming cognitive maps.

Thus, what constitutes an "information gap" seems to change relative to a person's objective. In this regard, we recommend that future research not focus solely on the ability to reach a destination efficiently, but rather develop protocols for providing different types of information relative to a variety of different performance goals. In this regard, a future research project might develop methods to learn what information is most needed for the effective exploration of new spaces and the process of forming an accurate cognitive map. We suspect that desired information in this case may vary across the diversity of individuals with visual impairments.

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The Effect of an Educational Program for Persons with Macular Degeneration: A Pilot Study

Theresa Marie Smith, Kimberly Thomas, and Katherine Dow

One in eight Americans aged 65 and older has an eye disease resulting in low vision (National Eye Institute, NEI, 2006). Macular degeneration is the leading cause of vision loss in the United States for persons aged 60 and older (NEI, 2007). Compared to individuals without disabilities, individuals with low vision demonstrate a 15% to 30% higher dependence on others to perform activities of daily living (Burmedi, Becker, Heyl, Wahl, & Himmelsbach, 2002). In addition, low vision can adversely affect a person's quality of life (Brown, 1999; Lamoureux et al., 2007; Scott, Smiddy, Schiffman, Feuer, & Pappas, 1999; Stelmack, 2001; Wolffsohn & Cochrane, 2000).

Vision rehabilitation has been shown to improve the performance of everyday activities and to increase the quality of life of people with low vision (Lamoureux, Hassell, & Keeffe, 2004; Lamoureux et al., 2007; Teitelman & Copolillo, 2005). However, a standard of care has not been established for low vision rehabilitation, and most outcome studies have focused on individual, rather than on group, rehabilitation (LaGrow, 2004; Lamoureux et al., 2007; Teitelman & Copolillo, 2005). However, a standard of care has not been established for low vision rehabilitation, and most outcome studies have focused on individual, rather than on group, rehabilitation (LaGrow, 2004; Lamoureux et al., 2007; McCabe, Nason, Turco, Friedman, & Seddon, 2000; Pankow, 2000).

We thank the Lighthouse of Houston for the use of its facilities to hold the educational program and O. Jayne Bowman, Ph.D., O.T.R., for her assistance throughout the research project.
Luchins, Studebaker, & Chettleburgh, 2004; Scanlan & Cuddeford, 2004).

The purpose of the pilot study reported here was threefold. First, we sought to pilot-test a new instrument that measures independence in activities of daily living, the Smith’s Activity of Daily Living Independence Survey (hereafter Smith’s), which is in the early stages of development and is being designed specifically for use with people with low vision. Second, we sought to pilot-test an educational program that has been developed specifically for a low vision population to determine if it needs to be altered to be more effective when used with people with low vision. Third, we wanted to determine if the methodology that we used in the study needed to be revised so that the effects of an educational program on the independence of persons with macular degeneration in everyday activities can be more effectively determined by identifying factors that may affect the strength of any treatment effect.

The research hypothesis was this: Individuals with low vision who receive the educational program will demonstrate higher change scores in independence in their activities of daily living than will individuals with low vision who do not receive the educational program. To obtain additional information about the educational program if the research hypothesis was confirmed, the following research question was posed: Which of the six sections of the Smith’s was responsible for the overall score of the Smith’s being statistically significant?

METHOD
Design and participants
The pilot study used a quasi-experimental pretest-posttest research design with a non-equivalent comparison group. Participants, both men and women aged 55 and older, were recruited from the Lighthouse of Houston. All had been diagnosed with macular degeneration and had a moderate to severe level of visual impairment and a score of at least 23 on a modified Mini Mental State Examination (Folstein, Folstein, & McHugh, 1975). The institutional review board of the university with which we are affiliated approved the study. All the participants were read the consent form and then gave written informed consent before taking part in the study.

Although 20 persons were recruited from the Lighthouse of Houston, because of attrition there were 16 participants, 8 in the treatment group and 8 in the comparison group. Members of the comparison group chose to be in that group because although they indicated they were interested in attending the educational program, they would not commit six weeks to the study.

Procedures
After the participants gave informed consent, they completed a modified Mini Mental State Examination (MMSE, Folstein et al., 1975). The MMSE was modified by omitting the construction task, since it requires vision to replicate a figure with paper and pencil. Members of the comparison group completed all the instruments in their homes, and members of the treatment group completed all the instruments on the first day of the educational program at the Lighthouse of Houston. After the treatment group completed the educational program, the Smith’s (Smith, 2007) was given as a posttest to all the participants. All the participants were eligible for a remuneration of $25 when the program ended.

Instrument
The Smith’s (Smith, 2007), which measures the level of an individual’s independence in activities of daily living, was developed to evaluate the educational program and is in the initial stages of development; therefore, no psychometric data are available on it. The questionnaire contains 26 items that are divided into six areas: self-care, food preparation, home management, shopping, communication, and
financial management. The level of independence for each activity is rated on a Likert scale from 1 to 10, with 1 = extremely poor, 2 = very poor, 3 = poor, 4 = below average, 5 = average, 6 = above average, 7 = good, 8 = very good, 9 = excellent, and 10 = outstanding. The option of answering "NA" (not applicable) is available if an activity is not performed.

Treatment

Treatment consisted of the educational program, a six-week program for two hours per week that included classes on self-care, food preparation, home management, shopping, communication, and financial management. The self-care topics were shaving or applying makeup, performing oral hygiene, learning how to mark and recognize personal care products, distinguishing food when eating, and identifying medication. The food preparation topics were pouring liquids and measuring food, seasoning food, and organizing food. The home management topics were cleaning the home, operating appliances, managing clothing, and modifying the environment for safety and ease. The shopping topics were preparing a shopping list, locating items, reading ingredients or prices, and determining expiration dates. The communication topics were writing notes, signing one's name, dialing the telephone, and determining the time and date. The financial management topics were identifying paper money, identifying coins, reading bills, writing checks, and reconciling bank balances.

At the beginning of each class, one of the authors reviewed the objectives of the class. The three authors alternately led the classes, but all three were consistently present to assist the participants. A notebook was given to the participants during the first class, and a packet of information printed in enlarged bold print was added to the notebook for each class. By the end of the educational program, the participants had a notebook with course information from the six classes, as well as assistive devices that were used in the educational program, including "bump dots," double-sided spatulas, bold-line paper, vis-à-vis pens, check templates, bold print and enlarged calendars, and signature guides.

Data analysis

The data were analyzed using SPSS, version 15.0. An average pretest daily activity score was created for each participant by calculating the mean of the 26 Smith's items before the educational program was initiated (Smith, 2007), and an average posttest daily activity score was created for each participant by calculating the mean of the 26 Smith's items after the educational program was completed. The change in the overall pretest score and the overall posttest score was calculated for each individual. The change scores of individuals in each group were then analyzed using an independent t-test. Next, each person's scores on items within each category of the Smith's were averaged to create a mean score of self-care, food preparation, home management, shopping, communication, and financial management for each participant.

RESULTS

Demographic characteristics of the participants

Of the 16 participants, 3 men (37%) and 5 women (62.5%) were in the treatment group and 2 men (25%) and 6 women (75%) were in the comparison group. The participants in the treatment group ranged in age from 64.04 years to 93.30 years, with a mean age of 80.81 years and a standard deviation of 10.80. The participants in the comparison group ranged in age from 71.01 years to 91.95 years, with a mean age of 81.08 years and a standard deviation of 6.22. The minimum acuity level of the participants in the treatment group was 20/400, and the maximum was 20/90, with a median of 20/200. The minimal acuity level of the participants in the comparison group was 20/400, and the maximum was 20/90, with a median of 20/200.
was 20/400, and the maximum was 20/70, with a median of 20/200.

The educational level of the treatment group ranged from 12 to 17 years, with a mean of 14.5 and a standard deviation of 1.92. The educational level of the comparison group ranged from 12 to 16 years, with a mean of 14.13 years and a standard deviation of 1.36.

Previous therapy reported by the 16 participants included low vision training or intensive training of multiple weeks, training in the use of adaptive equipment, and education on macular degeneration. In the treatment group, 1 participant had received low vision training, and 5 participants had received education. All the participants in the comparison group had received previous therapy; 3 participants had received low vision training (2 of whom had received intensive training), 3 had received adaptive equipment, and 2 had received education. The participants in both groups did not significantly differ on pretest scores, all \( t = 1.04, p < .30 \).

**Research hypothesis**

The research hypothesis stated that the independence of the participants in the treatment group in activities of daily living would improve more than that of the participants in the comparison group. An independent sample \( t \)-test was conducted to assess overall differences in the change in daily living activities between the two groups. The results revealed a significant group difference, \( t = 2.17, p > .05 \). The treatment group had significantly greater scores in changes in activities on the Smith’s \( (M = .659, SD = .96) \) than did the comparison group \( (M = -.210, SD = .60) \).

**Research question**

The research question stated: Which of the six sections of the Smith’s were responsible for the overall change score of the participants on the Smith’s being statistically significant? Six independent sample \( t \)-tests were conducted to test for differences between the comparison and the treatment group on the change scores of the six sections of the Smith’s (Smith, 2007). The results of these \( t \)-tests revealed no significant differences between the two groups on any of the six change scores.

Mean rankings for self-care activities were \(-.004 (SD = 1.98)\) for the treatment group and \(-.96 (SD = .97)\) for the comparison group. Mean rankings for food preparation were \(-.33 (SD = 1.74)\) for the treatment group and \(-.39 (SD = 1.31)\) for the comparison group. Mean rankings for home management were \(-.16 (SD = 1.38)\) for the treatment group and \(-.20 (SD = 1.04)\) for the comparison group. Mean rankings for shopping activities were \(1.78 (SD = 1.31)\) for the treatment group and \(0.61 (SD = 1.02)\) for the comparison group. Mean rankings for communication were \(0.80 (SD = 2.02)\) for the treatment group and \(1.16 (SD = 1.79)\) for the comparison group. Mean rankings for financial management were \(1.21 (SD = 1.90)\) for the treatment group and \(-.31 (SD = 1.01)\) for the comparison group.

**DISCUSSION**

The pilot study had three purposes: to pilot-test the Smith’s, to pilot-test the educational program, and to determine if the methodology used in the study needs to be revised before additional studies using the educational program are implemented. It is possible that the effect of the educational program may have been greater than measured by the Smith’s (Smith, 2007). Since the validity of the Smith’s has not been evaluated, it cannot be known if it is sensitive enough to measure changes from the educational program.

The educational program was delivered in a group format, which is consistent with much of the programming that individuals with low vision receive through state agencies. The effect might have been different had the educational program been administered to the participants individually. Limited outcome
studies for low vision rehabilitation have been conducted, and only three studies have been identified that address the effects of low vision on activities of daily living (Hooper, Jutai, Strong, & Russell-Minda, 2008). One of these studies, a health education program in activities of daily living, delivered in a group format, provided evidence that this method was more effective than an individualized program with training only in low vision devices (Dahlin-Ivanoff, Sonn, & Svensson, 2002). The completion of everyday activities by persons with macular degeneration usually requires optical devices, and the provision of and training in them is a primary goal of low vision rehabilitation. Unfortunately, in our pilot study, an optical evaluation was not part of the procedures.

Although the analysis of the data determined that the mean change score for the treatment group was significantly different from that of the comparison group, additional analyses for the six sections of the Smith’s did not determine where the difference lay. Rather, an additive effect of the six sections may have resulted in the significantly different mean change score for the treatment group. The Smith’s may not have been sensitive enough to detect changes in the six sections, or the educational program may not have produced an effect that was significantly strong for the change score for any one section of the program to be significant (Smith, 2007). It is possible that a Type II error may have occurred in the six follow-up analyses because the validity of the Smith’s has not been determined, the educational program did not have a strong enough effect, an optical evaluation was not performed on participants, or due to study limitations and weaknesses, which are discussed in the next section.

Limitations

The participants were limited to men and women aged 55 and older who were diagnosed with moderate to severe macular degeneration. All the participants were consumers of the Lighthouse of Houston and were given the Smith’s (Smith, 2007). Thus, the results of the study are limited only to researchers administering the Smith’s to participants who are aged 55 and older, were diagnosed with moderate to severe macular degeneration, and who have attended training sessions at the Lighthouse of Houston.

Several weaknesses in the study may have affected the results of the analyses. The number of participants (N = 16) was small, and we had difficulty analyzing the data to determine the effects of the educational program. An ad hoc power calculation using G power with an alpha of .05 for two groups with two repetitions revealed that a total of 86 participants is needed for a power of .80. In addition, the comparison and treatment groups gave informed consent, took the modified Mini Mental Status Examination (Folstein et al., 1975), and were administered the Smith’s (Smith, 2007) in different locations, which may have hindered or assisted groups in their performance on the pretest and posttest of the Smith’s.

Furthermore, we may have accepted a false null hypothesis because of a Type II error. Factors that may have led to a Type II error in this study included the sampling technique, type of instrument, and nuisance variables. An increase in the number of participants could have reduced the probability of a Type II error. We chose the nonprobability sampling technique of convenience sampling. Randomization did not occur and is necessary to ensure that the populations in the treatment and comparison groups are equal in terms of characteristics. Next, the nuisance variables of time frame, prior therapy, educational level, and visual activity level may have caused a Type II error.

The time between the pretests and posttests totaled six weeks. Because of this short time frame, the participants may not have had time to incorporate the skills they were taught in
the educational program into their daily lives. Prior therapy for their low vision might have also affected the participants' scores on the pre- and posttest measures. The results indicate that more members of the comparison group than of the experimental group received prior therapy. In addition, members of the experimental group were more educated than those of the comparison group, and this difference may have affected the results because of the ability to find resources to assist in low vision training. Also, the experimental group had poorer visual acuity than did the control group, a difference that may have affected the effects of the educational program on the participants' level of independence in activities of daily living.

CONCLUSION

Although there were some significant findings in the pilot study, the sample was small. However, the findings suggest that if the educational program is used with a larger group, it should produce a change in the level of independence in everyday activities. It is important that further research investigate the efficacy of low vision rehabilitation. Randomized controlled trials and controlled studies are needed to determine the best practice to promote independence in everyday activities for the growing population of persons with low vision.

REFERENCES


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